ANNUAL DYEING, BLEACHING AND FINISHING ISSUE

# COTTON

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Number Eleven
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SEPTEMBER, 1915

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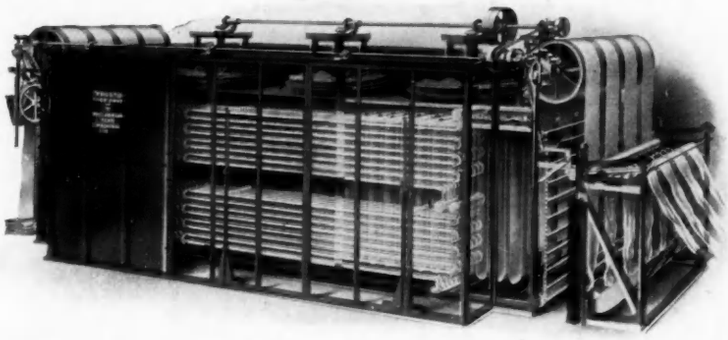
## "PROCTOR" DRYING MACHINES



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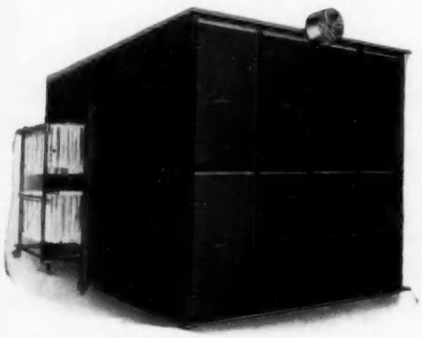

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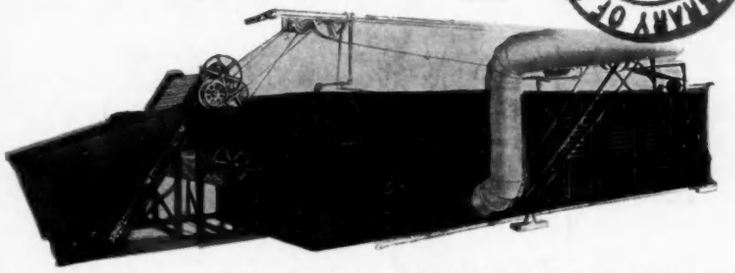

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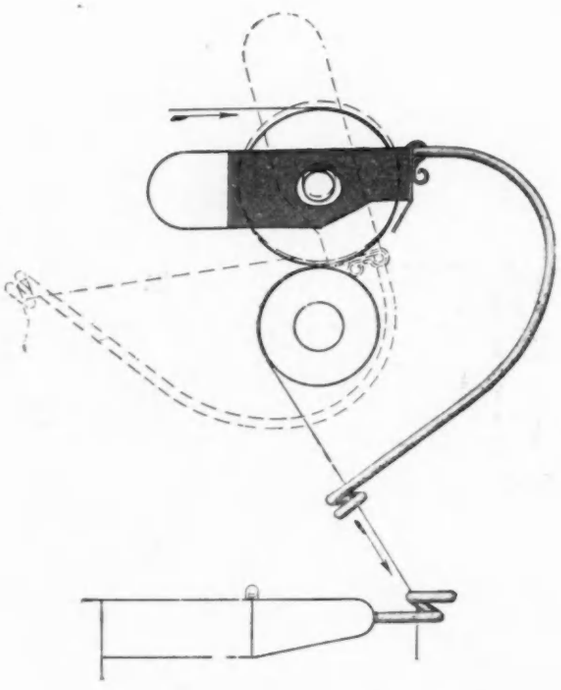

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# COTTON

**Published Monthly**

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**L. L. ARNOLD, Editor**

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## A DEVELOPMENT CONFERENCE.

American manufacturers are experiencing a decidedly new sensation. For the first time within the memory of most textile men they are being asked to prepare products for an educated and discriminating public and at the same time are being denied a part of what has heretofore always been considered the necessary constituents in the preparation of these products. For example, the, public has become educated to demand fast colors and numberless shades and combinations, and this public demand continues, regardless of such events as dyestuff shortages or European wars. It is, therefore, up to the textile manufacturer to furnish what the public demands and if the materials previously used cannot be obtained, to investigate and find something else that will be just as good or better.

There are, perhaps, those who will scoff at the suggestion. Less than sixty years ago the celebrated German chemist, A. W. Hoffman, likewise scoffed at young Perkin and advised him to throw away and have nothing to do with the new coal-tar color he had accidentally discovered and which became the fore-runner of the numerous artificial coloring matters so well known at the present time. Be that as it may, is not the present an opportune time for investigation and study?

Would not cooperation and "team work" on the part of the manufacturers' associations and the industrial chemists tend to evolve something of mutual interest and value? The planter, too, might be benefitted. The German technologists have been very active in the industrial field and have received the moral and financial support of the manufacturers. It is one of several things that has helped to make Germany commercially strong.

America is just now realizing the inconvenience of being dependent on the raw and finished products of other countries, but still the demand for articles made from foreign grown silk fibre continues, when mercerized cotton gives greater service and already has a handsome appearance. Proper scientific investigation and study could, no doubt, devise some means to improve on this appearance. Methods to further substitute cotton for wool could just now be investigated with profit. Felt, sheep skin and Russia isinglass are all used in the roller covering process and all are gaining in price because largely imported, either in the finished form or as the raw material. Literally hundreds of other articles are in the same category, one of the most important of which are the various forms of dyes.

From April 24th to 29th, 1916, the Textile Exhibitors' Association will hold their big textile machinery exhibit at Mechanics Hall, Boston. At this time the National Association of Cotton Manufacturers usually hold their annual meeting at the same place. If the officers of these two associations could arrange with the officers of the Amer-

ican Cotton Manufacturers' Association for a joint conference at the Boston show of about two days' duration, at which the industrial chemists of the country would be present by special invitation, would not the good to the industry be more than worth the effort?

Subjects for papers and discussions at such a conference are many and might include the bleaching of raw cotton, cotton yarn and cotton fabrics, using chlorine, hypochlorites, peroxides and permeanganates; the dyeing of similar materials with the various dyestuffs; the printing of cotton fabrics with dyes and with metals; the production of sun-fast colors on cotton; the production of laundry-proof colors for cotton; the waterproofing of cotton fabrics; mercerizing, crepeing, fireproofing, sizing and others of a like character. Discussions on substitution in raw materials would be in order. Tentative measures for permanent cooperation might be a result. Prizes might be offered by the joint associations for investigation and invention along certain lines. Best of all, the interest of individual manufacturers might be aroused in the untold value of chemical research work and numberless personal ideas suggest themselves that would later be developed at the mill or in the laboratory.

What do *you* think?

## FUTURE PROSPECTS FOR DYESTUFFS.

The shortage in dyestuffs caused by the European war has made members of the textile trade thoroughly interested in anything that seemed to promise relief. The following extracts from an article in *Bradstreet's* gives an idea of the efforts being made to produce in this country the necessary bases for the manufacture of coal tar dyes:

"The United States Steel Corporation is erecting three benzol plants in connection with its by-product coke plants at Sharon, Pa.; Gary, Ind., and Birmingham, Ala. Other plants are being erected as follows: Cambria Steel Company, Johnstown, Pa.; Republic Iron & Steel Company, Hazleton, Pa.; Lackawanna Steel Company, Lackawanna, N. Y.; Inland Steel Company, South Chicago, Ill.; Northwestern Iron Company, Mayville, Wis.; Zenith Furnace Company, Duluth, Minn.; Laclede Gas Company, St. Louis, Mo. The Youngstown Sheet & Tube Company is building 204 by-product ovens at Youngstown, Ohio, and these will probably be supplemented with a benzol plant.

"The estimated yield of benzol from a ton of coking coal is between two and three gallons, so that the average yield of benzol from each of the plants now in course of construction may be placed very conservatively around 3,000 gallons a day, or 30,000 gallons for the ten plants. If the average price to be received for the product be estimated at 40 cents, this means, on the basis of a 5-cent production cost, that the steel companies of this country will receive a total addition to their profits of $10,500 a day. Even placing the price at the low level of 11 cents in normal times, the net gain in earnings for the companies would be nearly $2,000 daily.

"Toluol, which is obtained in the benzol process, is one of the principal bases for the manufacture of chemical dyes. The threatened dye famine has caused the cloth manufacturers to turn their hopes to the coke plants for future supplies. It appears, however, that the dye process is still in an experimental stage here, but both steel and oil interests say that with the development of the by-product industry in coke there is no reason why the manufacturers of dyes in this country should not be brought to a point where the bulk of the needs of our dyers may be met at home. Some big oil interests who are closely in touch with the benzol situation even go so far as to predict that with the proper kind of encouragement the United States will be an exporter of toluol and benzol in competition with Germany after the war.

"Toluol and benzol also play an important part in the manufacture of picric acid and other explosive compounds, and it is owing to this fact that the present overwhelming demand is due. The price of benzol has risen from the normal level of from 12 to 25 cents to $1 to $1.25 a gallon. One large steel company which is erecting a benzol plant has already contracted for the sale of all its product at $1 a gallon, the contract covering a considerable period of operations. The estimated cost of making benzol is from 5 to 10 cents a gallon.

"This is one of the instances where those who got into the field last will reap the largest profits. The companies that first started to erect benzol refineries got, it is true, high prices, some of the earlier contracts being made at around 40 cents a gallon. But as it appeared that the supplies from these sources would not be sufficient to meet the requirements of the manufacturers of explosives, others were induced to go into this business, and they were able to demand and get from two to three times this price."

## SOUTHERN TEXTILE ASSOCIATION.

W. M. Sherard, president of the Southern Textile Association, has announced the following arrangement committee for the semi-annual convention which is to be held in Greenville, S. C., November 4th to 6th inclusive:

Robert F. Bowe, chairman, Harold C. Smith, V. M. Manning, H. C. Mims, F. J. P. Coggswell, and George M. McNider.

This committee will be instructed with the duty of looking after the entertainment of the large crowd that is expected to attend the convention and from the way in which they have entered into their duties every indication is that the visitors will have a good time.

This will be the most important meeting of the Southern Textile Association yet held, for in addition to the special program of the convention there will be held in connection with it the Southern Textile Machinery Exposition which will draw many visitors besides the regular members of the association.

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The course of the cotton goods market in south China so far the current season has been somewhat more favorable than was anticipated. Stocks have been moving very slowly and for the time being trade is dull, but the undertone of the market is steadier and more satisfactory and the promise of the immediate future is more favorable. There is little prospect of satisfactory general business, but the chance of a very unfavorable turn of things is much less pressing than it was. On the whole, dealers are encouraged and the tone of the market is healthier.

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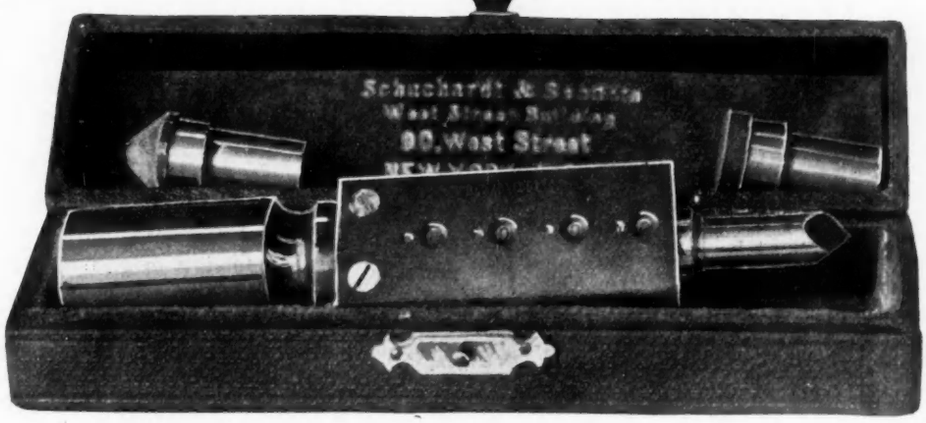
**$5.00** Imported High Speed Indicator Outfit in Case

**FREE** To You for a few Minutes of your time.




Our Service Department desires the opinions of active mill men on the quality of the work shown in the advertising pages of this issue of COTTON.

We are, therefore, going to give this indicator for the best letter by a mill executive who gives the clearest and most definite reasons why, and in what manner, any certain advertisement is, in his opinion, the best.

Contestants must be mill executives, from overseers to presidents, connected with spinning, weaving, knitting, or finishing plants. The letter must be accompanied by the name, address and official position of the writer in order to be eligible.

The judges will be the Editor of COTTON and the Manager of the Service Department, whose decision will be final.

Address Contest Department of COTTON, Atlanta, Georgia.

The above announcement was printed in the July issue of COTTON and the prize awarded to Herbert J. Watkins, foreman of the Testing Department, Skenandoa Cotton Co., Utica, N. Y.

The announcement is repeated in this issue and contest letters are eligible in this competition if received before or on October 15th. Letters received later than October 15th will be barred from the contest.

## THE WINNING LETTER.

BY HERBERT J. WATKINS.

It is my opinion that the advertisement in the issue of July, 1915, of the Scott & Williams hosiery machines is the best for the following reasons:—

Each and every important claim that is made for these machines is clearly and concisely stated. The average buyer is too busy a man to spend much of his time reading advertisements, but should he need an article, and look through a magazine or periodical to find an advertisement of it, and, after doing so, read a few words in large print which give only a vague idea of the advantages and qualifications of the article, and which ends with "Write for particulars" or "Full and detailed information upon application," the odds are that he will decide that he has not the time to write or dictate inquiries just then, and once it escapes his mind he probably never resurrects it, and will never communicate with the advertiser.

Of course this style of advertisement could not be used on every article advertised in COTTON, as it is necessary to send out a description of some articles in pamphlet form, but I have estimated that if about 90 per cent of the advertisers had used an inch or two more space, and cut down the size of type, that a good general description of the articles could be given, and the buyer would be in a better position to know, without further information, whether the article was suitable or not for his use.

Competition and general conditions are such today, that the owner and purchaser have to use every precaution when investing in new machinery and supplies to ascertain where the saving in money, time, material, floor space and labor is to be made, and the invariable question asked after reading an advertisement is ,"What and how much am I going to save by the prospective purchase or installation?"

From the reading of the Scott & Williams advertisement, in my estimation, a buyer should know whether or not this machine comes up to the standard of his requirements.

1116 St. Vincent St.,
Utica, N. Y.

L. L. Arnold,
Editor "Cotton."

Dear Sir:—

Both surprise and pleasure on my part greeted the arrival of the Speed Indicator which you forwarded me as the Prize in your Competition of July.

As the handing of "Boquets" to Cotton, would at present seem out of place, by me I will just simply *thank you.*

Sincerely yours,
Herbert J. Watkins.

Aug. 20th, 1915.

# Economics of Textile Coloring

BY DR. LOUIS JOSEPH MATOS.

The dyehouse departments of textile manufacturing concerns are gradually, though slowly, receiving the attention from mill managements that their importance deserves. For many years the term "Dyehouse" as a place where important manufacturing operations were carried on was one, more of derision than otherwise. The dyehouse itself, as a working department of a mill, was generally located in a place that was seldom adapted for the purpose and which, by no stretch of imagination, could be made available for the use of any other manufacturing deparment. The inelegant though very prevalent and expressive term, "dump," fully describes what in many mills is the place where the important dyeing operations are carried on.

During the last decade, however, owing to the increasing demands of jobbers and consumers of cloth, the color manufacturers have been bringing out and introducing dyes that require extended and somewhat more complicated processes for their application to textile fibres than formerly, and consequently the dyehouse has to be suitably equipped to meet and cope with these new conditions by increasing its facilities to handle the new processes and methods imposed upon it. In the old days, when only wood colors were used, the demands of the clothing trade were not as severe as they are today, and the simplest equipment sufficed for nearly all the dyeing operations required. Reference to text books and treatises of fifty and more years ago, not only in English but in German and French, shows that the appliances required by the dyer were very modest in comparison with the modern installations of today. As a general rule, the dye vats were huge copper kettles heated by direct fires, much after the fashion of soup caldrons. The ability required to carry on the dyeing processes and oversee the operations was generally of no very high order, the shades being built up to their proper depth by the addition of suitable coloring matters as the dyeing progressed, and as a result, the dye house of the period was of little consequence. Old records show that close matching was never attempted. The dyer was given an order for a dark blue and he produced what he considered to be a dark blue. If a black was ordered, he produced a black, and the same condition applied to the fancy colors. Successive lots being ordered from time to time, no attempt was made to produce the original shade, but to come as close to it as the variations in the qualities of the several dyestuffs permitted. It has only been since the introduction of the coal tar colors that well drawn lines have been laid down in the matter of shade matching, and close competition, perhaps more than anything else, is to be given credit for what we now recognize as the ability to produce exact matches in subsequent lots of material dyed.

In the old days it was generally the custom to dye the bulk of the wool in the raw state, hence the term "dyed in the wool" has been handed down to us for generations as a criterion of the perfection of dyed fabrics. After the introduction of the artificial dyes, and the greater control of their color values, dyers became accustomed to the necessity of producing closer and more exact matches than was possible with the older wood colors, and with the cooperation of the color makers who standardized their products more accurately, naturally contributed to aid the dyer in keeping close to the line of exact matches.

Omitting all technical references to the various classes of artificial dyestuffs that have been brought out from time to time, and also to the details of the mechanical appliances that have been found best suited for the application of the dyes, it will be of interest to give our attention to those methods of dyeing that have gradually been introduced into dye houses that tend to eliminate not only the useless expenditure of time but also of material. It is generally conceded that while great advances have been made by chemists in perfecting dyes and the chemical methods of their application, the mechanical side of these latter processes has been in the main neglected. While it is true that many dyeing machines have been invented from time to time, yet there are but few radical inventions in daily use that can be regarded as distinct advances.

Textiles are dyed in four different conditions, *viz.*, as raw stock, yarns, warps, and as piece goods, each of which constituting the basis of an important division of the dyers trade. Having particular reference to cotton, we may briefly allude to the methods applicable for coloring raw stock. Formerly and for many years, raw stock cotton was dyed in large vats into which the dyestuff and the material to be dyed were introduced together and kept in motion by laborious poling. At best a man-killing operation. Not only was the waste of labor excessive, but also that of steam. In some mills this method has not been very much improved. Later, machines were devised for doing away with, or minimizing the amount of manual labor. These machines are generally rotary, horizontal, perforated cylinders or baskets, inside of which the raw cotton is placed; the whole revolving in a dye vat, the result being that the cotton is kept in motion through the dye liquor. This method remains to be improved upon, although minor mechanical improvements in the machine have been brought out from time to time. The principle of dyeing raw cotton by this method also appears to be perfectly sound in dyeing cotton yarn. The turning of cotton hanks hung on poles, by hand, has been the common method for many years, and while excellent results are possible, the output is limited to the speed of the men working over the kettles and the combined affinity of dyestuffs for the cotton, and which cannot be exceeded or influenced.

During the last twenty-five years, rotary dyeing machines for yarns have been much employed; while other machines intended to give to the yarn, while immersed in the dye liquor, the same motion that is imparted to it by hand, and although such latter machines are fairly successful, it is to be doubted, all things considered, if they are equal in their results to hand worked cotton when carefully manipulated.

The rotary machines for common use are so constructed that the yarn itself is moved slowly through the dye liquor and consequently the output of a cotton yarn dyehouse operating such machines is enabled to turn out a greater amount of finished yarn per man than when dyed in the open kettles while the yarns will also be in a generally better condition for winding.

Strong claims have been made from time to time for the dyeing of cotton yarns in the so-called "pack" machines, but it is doubtful if constantly uniform results are to be expected from the use of such apparatus. The main problem in connection with the use of such machines appears to be the occasional occurence of "leads" in the mass of cotton which is to be dyed and which result in uneven dyeings. Another point to be considered in the use of "pack" machines as against machines of other types, is the labor cost of packing and unpacking. This is the most serious drawback when yarns are to be dyed. For raw cotton, the labor cost is negligible, but for yarns, the circumstances are entirely different.

Cotton warps have always been an important and interesting article to dye, but it seems that at the present time, we are nearing the solution of the various difficulties usually encountered in dyeing cotton yarns in this form. For several generations, cotton dyers have overcome their uneven results by the use of dyes of all classes in the old Scotch tubs and in the so-called box dyeing machines with the overhead rollers.

Today it is believed that warp dyers begin to see daylight from the introduction of advanced methods for dyeing cotton on the beam, in which the warps are dyed by the alternate circulation of the dye liquor through the warps as they are wound on hollow beams and which may or may not rotate in the dye liquor while the dye liquor is circulating. It is to be admitted, however, that the early days of beam dyeing brought forth many discouragements in which the dyer, the dyestuff salesman, and the beam dyeing machine inventor equally shared. As a result of perseverance, however, the difficulties of dyeing by this method are being gradually overcome and the warp dyer has reason to believe that, except in a few minor details, perfection will soon be achieved.

Other and advanced types of warp dyeing machines are also receiving attention, in which the warps travel through the dye liquor which is maintained at one constant degree of concentration for a given number of minutes for a particular shade.

In the matter of piece dyeing, the author has covered this phase of textile coloring in a paper read before the National Association of Cotton Manufacturers, at Boston, in 1914, and which contains the essential points of coloring cotton in this form, and which was reprinted in COTTON June, 1914.

The underlying principle of the operation of the dye house department of a mill, is to enable it to exercise direct oversight in the matter of its own coloring, and to make use of the best means and most economical methods for the satisfactory production of the particular quality of goods that the mill is capable of. This necessarily implies that a mill, owning and persisting in operating defective or obsolete equipment, cannot possibly turn out first class goods, no matter how skillful the rank and file of its operatives may be. Such a mill cannot make the highest grade of fabrics from inferior grade of stock. It therefore means that where the management of a mill has in mind the production of goods of a given class and grade, the means and equipment necessary to produce that class of goods must be installed.

In the matter of fancy colored fabrics, should their manufacture be contemplated by a mill, the dyehouse of which is planned only for blacks, the attempt will be foolish, although it is surprising to note that some mills have undertaken the dyeing of fancies with an installation that was at best, defective even for blacks. Where fancies are to be manufactured, being a class of goods that require very careful oversight in every stage of manufacture, all the dyeing and finishing operations through which the pieces pass, should be carried out with suitable dyes, and in machines adapted to and used for no other purpose. The greatest trouble encountered by mills undertaking the manufacture of fancies is in the preparatory operations and processes. The idea prevails among many that the scouring of woolen, or the boiling-out of cotton pieces can be hurried, and that any possible defects due to improper treatment may be overcome in the dyeing and the finishing operations, but the experience of skilled practical dyers determines conclusively that unless the goods are thoroughly scoured and rinsed before entering the dyehouse, perfection cannot be attained. Scouring of woolen piece goods requires time, careful handling in the scours, and a properly prepared scour liquor. If the cloth contains only pure wool oil, consisting of saponified or distilled red oil, olive oil or other easily saponified mixtures of oils, the "starting" of the oil with a mild alkali is easy if the temperature is kept down, and sufficient time allowed. The idea being to completely convert all the oil in the cloth into soap with an alkali, and then effectively wash it out before dyeing.

Streaks and shaded areas and other irregularities will show when least expected, and which cannot be overcome by "cobbling" or re-finishing. Proper economy in scouring, rinsing and dyeing is best accomplished only when a sufficient amount of time is given to these important processes, and where the operations have been carried out properly, the number of "seconds" and other defective pieces will be reduced to a minimum.

The drawback that handicaps the piece-goods dyehouse is the number of "re-dyes" that turn up at varying intervals and which must be disposed of by the mill either at a loss, or by being returned to the dyehouse and finishing room for re-handling. Not only are such goods somewhat impoverished by so much re-working, but the time lost cannot be regained, and certainly no charge can be made for the extra work that the re-handling necessitates.

Cotton piece goods are mostly jig dyed, but simple as this method is, defects are frequently found in the finished fabrics, that seem to be quite beyond the ability of any one to determine the cause, and these defects can only retard the output of the dye-house. Perhaps the most serious source of trouble originates in the boiling, by not being thorough. If the cloth is not made absolutely clean and free from all natural and added impurities, for example, warp sizing, etc., it is very difficult for the dyer to deliver goods of maximum possible penetration. Another source of trouble too frequently present in many mills is the possibility of splashes of oils or chemicals getting on the goods, after coming from the kiers and before going to the dyehouse. Sometimes spots occur that are soaking into the rolls for several days before being discovered and then it is too late to do anything effective. A frequent source of spotting is traced directly to oil from overhead machinery, trickling its way through floors and along beams, until it drops upon the piled up rolls below. It is cheap insurance to equip all overhead machines with suitable drip pans and thereby lessen the cost of overworking pieces in the attempt to remove stains that should never have occurred.

The most satisfactory dyeing results will always be se-

cured where the fullest consideration is given to the preparation of the pieces. The kier boiling, chemicking and the final washing are necessary and each operation should be carried on only so far as to give the best possible result in the shortest time. Washing is by no means the least important and many cloudy or shaded pieces, or pieces in which the penetration of the color was not good, can be traced to a too limited use of water.

There are many dyers and finishers, who believe that working overtime is often responsible for a number of "seconds" and other defective pieces, and it appears that increased economy will be better obtained if the passage of pieces through the dye houses can be so regulated as to obviate this evil.

If the volume of work going into the dye house is so great that it cannot be properly handled during the usual working hours of the mill, then it becomes necessary that only such operations as do not require daylight, should be carried on into the evening, leaving the actual dyeing operations to be done during daylight hours. If a mill has so outgrown its normal capacity, and the dyehouse is suffering by being pushed to the extreme, then it becomes apparent that the obvious course to be pursued is to enlarge the dyehouse to keep pace with the other mill departments, and in enlarging it, to install approved appliances that will properly handle and take care of the different classes of goods passing through it.

A most serious drawback is where the number of pieces from the looms tax the capacity of the scouring boxes. When the scour-boss is conscious of a mountain of pieces waiting to be scoured, there is a consequent lurking temptation to slight some of the work in order to get it out of the way as quickly as possible. Where a dyehouse is handicapped by a shortage of dye kettles, and the scoured pieces are piling up at a rate faster than the dyehouse can take care of them except by working overtime, we are again confronted with the temptation to do hurried work, which of course, is detrimental to the quality of our output. These remarks apply with equal force to a dyehouse that is able to take care of the yardage, but which crowds the finishing department.

Some mill managements have given considerable attention to the matter of "seconds" and re-dyes, with the idea of devising means for reducing the number and consequently operating their dyehouses at a lower cost per piece, at the same time recognizing that even in the best regulated mills, seconds will occasionally appear. Various suggestions have been advanced to how best accomplish this result, and it seems that a solution of the difficulty may possibly be reached by the gradual introduction of a system of credits, which can serve as an inducement for the boss dyer to exercise greater personal supervision and oversight in making his matches, and also to provide for the delivery of his pieces in the shortest time commensurate with good work. In other words, to put a premium on work so perfect that when it leaves the dyehouse or finishing room, it is beyond the possibility of return for defects due to bad workmanship.

It is known that the greater the length of time that pieces are in the kettle during dyeing and matching, they are suffering some deterioration, and the purpose of such a system as that outlined is to enable the dyer and his helpers to get well dyed pieces out of their hands in the shortest time. This always works to the advantage of the condition of the pieces, for we must always bear in mind that the pieces are yet to go through various finishing operations.

In some mills it has been found to be an advantage to credit the dyehouse with a certain percentage of absolutely finished pieces, and for all pieces over this percentage there is allowed an additional credit that can appear to advantage in the pay envelopes, for after all, it is what a man receives in the way of tangible remuneration that becomes the liveliest incentive to better workmanship and increased efficiency.

Credits against wastefulness are likewise receiving increased attention and this has been brought about by the frequently published accounts that have appeared from time to time in mill engineering circles regarding economy in shop supplies, the coal pile, etc., and which can be made to show equally as well, not only in dyehouse supplies, such as dyestuffs, chemicals, etc., but in soaps, oils, and alkalies that are consumed in the scouring and finishing departments.

In many mills, both large and small, the idea of practical economy was formerly completely lost to sight, the management neglecting to exercise proper discipline and caution in the matter of preventing waste, or of preventing the reckless use of supplies placed in the several departments to work with. These conditions bring forcibly to our notice the necessity of a properly organized and directed department of supplies and accounts, to constitute a separate division of a mill, but about which it is not my purpose to discuss in this paper.

The training of dyers to properly fill positions in textile mills is receiving closer attention from all concerned than was formerly the case. The textile schools are doing everything that their facilities permit, but there yet remains much to be done.

One of the most important points to be considered in this connection is the adaptability of the individual to discharge the duties of a dyer. Many young men, otherwise competent, who are deficient in elementary education, seek entrance to the ranks of dyers through the old method of working as an apprentice in a dyehouse in various capacities until able to perform the duties of second hand, which position, when reached should seem as a stepping stone to that of dyer in his own or in another mill. If such a young man is observing and industrious, and works under the direction of a competent dyer who knows his trade, studies as opportunity offers, and avails himself of the facilities of acquiring technical knowledge, either by direct study or from a correspondence school, he should gradually develop into a first class competent workman and foreman.

The chief trouble experienced in studying dyeing, however, is the tendency to overload on the chemical side, sight being lost of the fact that the average young man aiming to become a dyer is not sufficiently advanced in his schooling to grasp in a satisfactory manner the usual chemical studies, and which condition, consequently, leads to an abandonment of chemistry, and an advance to empirical dyeing processes, the result being a total lack of knowledge of two very important principles upon which modern dyeing processes are built.

Dyeing operations are strictly chemical processes. A dyer who is conversant with the basic principles of chemistry and adapts them thoughtfully to his immediate work, is in a very strong position to accomplish that which a less informed workman is unable to do, and at the same time be a most valuable man on the staff of the mill.

It must not be supposed, however, that it is the idea to suggest that any dyer should be a chemist. The daily work of a dyer is generally so exacting, that it would be out of the question for him to do any kind of systematic chemical work. In fact the work of a dyer and a chemist in a mill differs so widely from each other that it would be impossible to find a man who could properly discharge the duties of each.

# Some Opinions on the Dyestuff Situation

STAFF CORRESPONDENCE.

Opinions on the dyestuff situation obtained from the prominent manufacturers of colored goods and from the heads of dye and chemical houses agree in one respect: that there is today a very real shortage of the colors urgently required by the American cotton manufacturers, and unless some very material relief is afforded before long the industry, so far as those using colors is concerned, will be in a most precarious condition.

The most encouraging note was sounded by the head of one of the big aniline and chemical houses, who made the positive declaration that within two years, at the outside, America will be producing her full requirements of dyestuff and never again will have to depend upon Germany or any other foreign color manufacturers. On the other hand, the treasurer of one of the big Boston commission houses and converters asserted that the American substitutes being offered for imported colors were not proving satisfactory. Nearly all the authorities connected with the manufacturing end of the cotton business, who were interviewed, agreed that it will not be possible for this country to produce sufficient quantities of dyestuff for domestic requirements for years to come, and some were of the opinion that no great effort will be made by the chemical companies to enter the aniline dye industry in a large way unless there is satisfactory assurance that their enterprise will be protected by an adequate tariff from the vigorous German competition which was predicted as inevitable when the war is over.

It was a striking fact that all the big dye importing houses insisted that attempts to develop the aniline dye industry in this country cannot be successful. These authorities declared that it will take years of experiment and study to learn to make the colors with which Germany has been supplying the American cotton manufacturers. They expressed the opinion that the American cotton industry cannot hope to obtain relief from the dyestuff shortage until England has been prevailed upon to modify the order in council which prevents American exportation of cotton to Germany and which has resulted in Germany placing a strict embargo upon the export of her aniline colors to foreign markets.

A. L. NORTON of the National Aniline & Chemical Works, Inc., with headquarters at 36 Purchase street, Boston, takes vigorous exception to the assertions of the color importing houses. He declares emphatically that the United States can produce and is producing large varieties of colors; that by 1916 his firm alone will be turning out about half the consumption in this country of blues and reds, and that the following year the American color makers will be in a position, if necessary, to supply the full requirements of the cotton manufacturers with a complete assortment of colors, with the exception, however, of some of the patented colors which it took Germany more than 40 years to develop.

Said Mr. Norton to a representative of COTTON:

"By October of this year the National Aniline & Chemical Works will be producing direct blacks at the rate of 4,000,000 pounds a year. This output is already contracted for by the users, and we can take no more orders for direct blacks until after January 1, 1917. Much of this production has been sold in the South to the cotton manufacturers.

"By January 1, 1916, National Aniline will be producing blues and reds at the rate of 10,000,000 pounds a year, which is about half the total consumption by this country of these colors.

"We are the only people in the country now producing any amount of colors, but other people will be increasing their production, too, and by 1917 this country will be able to supply the cotton manufacturers with plenty of colors. The cotton mill men will never again have to depend for their dyestuff on foreign producers.

"Of course, not all the colors that Germany has offered can be produced in this country right away. It took Germany more than 40 years to build up the industry and develop some of these patented colors and we can't hope to do it in a few weeks. For one thing, we haven't got the chemists to do it yet. But we will have them. We are getting them now."

Mr. Norton's attention was called to the prediction, made by many good authorities, that the domestic color industry cannot be developed in the face of the strong probability that the moment the war is over the German dyestuff producers will come back into the American market and with the advantage of their cheaper labor cost and superior experience and knowledge of the business undersell our domestic color manufacturers and quickly ruin their newly developed business.

"Nothing to it," replied Mr. Norton. "Germany isn't going to come over here and sell aniline colors for nothing. In the first place, 20 of her leading chemists, the heads of her leading color manufacturing plants, have been killed in the war. Their places must be filled. Then the organizations of these great industries have been completely wrecked by the war and the necessity of turning all their resources to the production of explosives. First, the German dyestuff people will have to reorganize their businesses and that will take a long time and will be very expensive. The country will be impoverished over there and they will have to make a fair profit on their offerings right from the start in order to continue their business. They won't be looking to a market like America where there is going to be close competition; they will first go after a market like China where they sold before the war more dyestuff than they sold to us and where they will have a better chance to sell their colors at a profit. Another thing—the cotton manufacturers are not going to throw us over the moment the war ends just because they may be able to buy the colors we offer a few cents cheaper than we ask—and, understand

me, I don't say they can buy any cheaper. There's gratitude in business just the same as in personal relations of men, and buyers that we have been accommodating and helping along in their business by getting colors for them won't forget it right away. When the tension is relaxed and color offerings are more abundant the buyers we have assisted will stick to us. In fact, I have the positive assurance that they will.

"In addition to this, I am confident our developing color industry is going to be protected by the government. If we didn't think so do you suppose we would be spending money the way we are in enlarging our capacity and increasing our output so enormously? Our people have interviewed representatives of the administration and we have positive assurances of fair treatment. I don't say that we will get a protective tariff on dyestuff right away. If the war continues there can be no doubt of President Wilson's re-election, and I believe that we will have a republican house and a democratic senate. But President Wilson has tariff learnings, I believe, and although you can't expect to get very much by a combination like that I am confident that President Wilson will be strong enough to get whatever tariff protection the growing dyestuff industry requires.

"There's going to be a little temporary shortage of certain colors, I admit, but within two years or less America will be producing her own colors in ample quantities, and it would not be at all surprising to me if not long thereafter we begin to build up an export business in dyestuffs of our own, in which Germany will find a rival to be reckoned with."

C. L. GAGNEBIN of the Farbwerke-Hoechst Company, 142 Oliver street, Boston, importers of chemicals and dyestuff, made the emphatic assertion that there is no hope of the production in this country of any appreciable amount of colors, and that the cotton manufacturers and dyers have no ground for hope of relief from the present shortage until the German production is again released for importation to America.

"We simply can't get colors," declared Mr. Gagnebin. "There is no hope of production in this country. It would take at least five years of study and experiment to even make a start here. The large dye users among the cotton manufacturers who are looking around eagerly for substitutes in our domestic market must remember that we can't start in a few weeks or even years a great industry which it has taken Germany half a century to build up. What the American cotton manufacturers must do is to bring all their influence and all the pressure possible to bear on the national administration so that England may be persuaded to modify that order in council which prevents us shipping cotton and cotton goods to Germany. If we are allowed to ship cotton to Germany, then Germany will see that we get the colors that we require so urgently.

"We are doing something with sulphur colors, a little something with blacks and vegetable dyes, but what we are doing here in America is hardly a drop in the bucket compared to the American demand. We've got to throw off that British influence and run our own country in our own interests.

"American color manufacturers are simply arousing false hopes that never will be realized when they talk about increasing their production and being in a position to supply the demands of the large users here of dyestuffs within the next year or two. It simply can't be done. The production of colors is only a small part of this industry. There are enormous quantities of by-products for which you must develop a market, and if you haven't a market for the by-products the dyes would cost prohibitive amounts. Even if the American firms knew how to make the colors, which they don't, it would take years to build up the market for the by-products here, after more years had been expended in experimenting and study to find out how to make the hundreds of colors with which Germany supplied us before the war.

"Our stocks of imported dyestuffs are already nearly exhausted, and when these colors are gone we must sit down and wait until we can resume our trade with Germany, or until we have prevailed upon England to let us alone."

The officials of the Bayer Company, Incorporated, 32 India street, Boston, insist that the cotton manufacturers of the United States will find the color situation hopeless until importations from Germany are resumed. This company was formed not long ago to handle the New England interests of Farbenfabriken of Elberfeld Company, one of the leading German dyestuff houses of the world, and it was named in honor of Frederick Bayer, the founder of the enterprise. Dr. R. Hutz, the head of the company, was out of town when the representative of COTTON called, and his associates expressed the views entertained at the headquarters of this big dyestuff house.

"The American users of dyestuff will find it impossible to get the colors they urgently require until England's order in council has been modified," it was declared. "It is out of the question for us to think of producing our own colors here in the United States. It can't be done. If there was any chance of manufacturing colors in any considerable amount here successfully the Bayer Company would be doing so at its factory in Albany—we would even build new plants. This is not idle assumption on the part of a house that has been engaged chiefly in the importation of aniline and alizarine colors from Germany, but a statement of positive facts that can be backed up by ample proof. The British Dyes Limited was recently organized in England in the effort to relieve the acute situation that has arisen there because of the cutting off of the German supplies of dyestuff. The British government took half of the capital stock and it was arranged that everyone who was supplied with dyestuff manufactured by the company should take an amount of stock equivalent in value in the case of each consumer to the amount of each consumer's annual requirements of colors. That, you see, provided for ample capital, and amounted, practically, to a government subsidy of the business. Yet with all these resources, with the raw material supplied by the Welsh mines and with the backing of the British government itself this company finds that it is able to supply only 12 per cent of the requirements of England alone. The leading chemists of England were retained to make an investigation when this company was formed and these chemists reported to the government that if in 15 years the British Dyes Limited could produce 25 per cent of the requirements of the United Kingdom, and in 25 years produce 50 per cent of the country's requirements of dyestuff the ends justified the means. The dyestuff industry was England's longer than it has been Germany's. Germany has

had it only about 60 years. Now if that is the best England can do when she has had years of experience in making dyestuff, has abundance of raw material and knows how to make the colors, how about the United States?

"The United States today couldn't even get the raw materials for the manufacture of colors. All our raw materials here suitable for the manufacture of aniline dyes are going into explosives to satisfy England's enormous requirements for ammunition. No American aniline company can entertain seriously any idea of supplying any appreciable part of the country's requirements for dyestuff. National Aniline alone could sell $10,000,000 worth of wool colors without leaving the office if they had the slightest chance of supplying it.

"The small stock of colors now left in this country will soon be exhausted, and the textile people will have to reconcile themselves to the fact that they must do without until they arrange to renew their supplies from the German producers."

F. HIGGINSON of T. F. Edmands & Company, 70 Kilby street, Boston, a firm that does all the buying of colors used by some of the principal New England mills, sees no immediate relief of the dyestuff shortage, but he anticipates that, eventually, the domestic offerings will be increased very materially.

"They already have started to increase the American production in certain lines, especially direct blacks," stated Mr. Higginson. "No doubt the direct blacks will be increased very materially. There also are a few fast colors coming from Switzerland. Switzerland is able to produce certain colors about as well as Germany, although on a much smaller scale, but the Swiss offerings are hardly likely to amount to enough to be more than a very negligible factor in the American dyestuff market.

"I find that each week the situation is getting worse, even though the shortage is being helped some by the use of logwood. If there is no increase in the supply of colors very shortly it is not going to be many weeks before many prominent colors will be entirely gone. The country will have to wear whites and blacks.

"There are very few standard German colors now in this country, and the German manufacturers have controlled this business so long that it will be like trying to build up a new industry for some of our chemical plants to attempt their production, even if the American chemists knew exactly how to produce some of the colors, so I can see no prospect of any relief of the shortage.

"In addition to the increased production of direct blacks here, certain colors, principally sulphur colors, undoubtedly will be produced by other people in this country. Aniline oil is now being produced in this country and in a very short time this production will be materially increased. Betanapthol and paranitraniline are now being produced in America in fairly large volume. In general, my opinion is that we must look to the end of the war to get relief from the shortage of certain colors which we have always obtained from Germany, while in other lines we will, eventually, have available a much larger domestic production."

E. P. FIELD of Bliss, Fabyan & Company, 72 Franklin street, Boston, head of the color-buying department which has charge of providing the dyestuff for all the mills represented by this big dry goods commission house, sees slight hope of relief from the color shortage through the development of American production.

"Only a few primary colors can be produced here," said Mr. Field. "I have read that our total consumption of colors is only about $12,000,000 annually. That is not a big enough item to make it worth while to put up plants and spend large sums in discovering processes, and so forth, even if there were any strong hope that we could succeed in producing the colors which Germany has been offering us so cheaply. Besides this, in order to make $12,000,000 worth of colors you must produce a lot of by-products of many times this value, and so before you can start making colors on any large scale you must have a market for these innumerable by-products. We haven't such a market, nor is there any reason why we should have it. Recently I saw an apt illustration of the real truth about the color industry. It was a picture of an oak tree, the huge trunk being the representation of the raw material, the coal tar from which colors are made. The branches represented the various things that are manufactured from this raw material, and the colors were only a tiny twig away up in the top of the tree. Now if this little twig represents the $12,000,000 worth of color products think of the enormous amount of by-products for which we must find a market before we can even think of producing and selling the colors.

"We were fortunate in having a fairly good stock of colors when German importations were cut off by the war, and yet we are beginning to feel the color shortage very seriously. I am now trying to get a certain green and I can't get it even at $10 per pound, but we are, however, hoping to find some substitute which will do about as well for the purpose. The fact that we are experiencing a color shortage does not mean that there aren't any colors in the country. There are colors still on offer here, although not a complete assortment, and although we shall, probably, have to do without some of the colors we have been accustomed to using, it will be a long time before our present stock is entirely exhausted, even without any further importations. I don't believe we shall get down to white goods entirely for a good many years, even if the war should continue so long. The men making fancy weaves are going to feel the color shortage much more quickly than others. I can get enough direct blacks to supply our mills for an indefinite time, but I can't get pinks, or salmons, or greens, or similar fancy shades, although I hope to find some sort of substitutes which will help to some extent. We are going to scrape along, but it is going to be a difficult problem for us, and there is no hope for any material relief from the American production of colors. We must do the best we can until Germany again is in a position to supply us.

"So far as the American production is concerned we are getting some blacks—principally sulphur blacks. They also are doing something with logwood, getting blacks, grays, slate and, by a certain process, an indigo. We can get a drab with a form of iron, but it won't make pink. The quotations on all colors now offered are extremely high; in fact, the prices are almost prohibitive. I recently had a quotation of 20 cents a pound on a black which was only 25 per cent strength, which would make the price 80 cents a pound, compared to a price of 14 cents a pound for the standard, or full strength

color before the war. I was offered a garnet at $1.45 a pound, and before the war you could get all you wanted at 30 to 35 cents a pound. A short time ago I wanted some sulphur black and sent for a sample of a lot offered me at $2.80 a pound. I tested it and found it was one part black and nine parts salt, which would make the price for the standard color $28 a pound, against a price of 14 to 18 cents a pound for the same standard color before the war. We are getting circulars all the time from the dyestuff people offering various assortments at such greatly inflated prices as I have mentioned, and although none of them have full assortments of colors today, this shows there are still colors enough in the country to keep us going for a while. Here's an offer of 10,000 pounds of sulphur black at $2.20. Before the war I could have bought this for 14 cents, or 18 cents at the outside; however, I still can get it if I really must have it.

"It will be some time after the end of the war, I believe, before we shall get back to old prices. However, even with these temporarily inflated prices there is no real inducement for American capital to engage largely in the manufacture of colors. I don't believe Congress is going to be able to give us any tariff legislation that would permit such an industry to exist after foreign competition again is active. This color industry is very insignificant compared to some of the other interests that want tariff legislation, and even if we are able to get Congress to listen to us they couldn't do anything without opening up the whole tariff question again, and that is something they surely won't want to do. We cotton men must make up our minds to get along the best we can with such colors as we find available until Germany is able to supply us once more.

"The shortage of colors is now having some effect on the movement of colored goods. We have had to instruct our salesmen not to take orders for colored goods of some shades, which we are not able to supply. Our policy is not to accept any orders for colored goods until we know we have sufficient dyestuff of the regulation shade to color them."

F. C. McDUFFIE, treasurer of the Everett Mills and of the York Manufacturing Company, with headquarters at 120 Franklin street, Boston, foresaw a year ago that a serious shortage of colors was inevitable. To make his available supply of dyestuff go as far as possible he put his mills on two-thirds time, cut out solid colors entirely in the cotton goods being manufactured, and cut down materially in the use of colors in striped goods, so that a piece with two stripes was turned out with one, or a wide stripe was made narrower, etc. Mr. McDuffie did not care to express himself for publication of his own personal opinion of the present shortage of dyestuff or to offer a prophecy on the future outlook.

HERMANN RAWITSER of P. Rawitser & Company, 287 Broadway, New York City, declared that with the continuance of the enforcement of the British order in council, under which all goods going to or coming from Germany are being held up, the situation in the textile industries which depend largely on imported dyestuffs is becoming acute day by day. His statement was the more impressive because it was accompanied by the announcement that one of the firm's largest mills would be closed within the week. Mr. Rawitzer said that things have come to such a pass as to make the closing of the mill absolutely necessary. It would not be done, he insisted, as a protest, but as an inevitable outcome of conditions which the company has to face. This mill, one of five, is located at Mystic, Conn., and employs 300 hands.

"We simply can't get the dyestuffs we want," said Mr. Rawitser. "For months we have been going along with such material as was available and the limit is about reached. We can't get what we need from Germany, and there is no concern in this country putting out dyes in sufficient quantities. Holland is full of dyes, contracted and paid for, with no chance of getting them to this country."

ARTHUR C. FARLEY of Farley, Harvey & Company, the well known dry goods house with headquarters in 141 Essex street, Boston, sizes up business conditions in the textile industry as quiet but evidencing a healthy conservatism which he finds very encouraging.

"Trade is not as brilliant as it has been in recent years," said Mr. Farley. "Business is being conducted on a basic condition of extreme but very healthy conservatism. There is no boom in sight, which is a good point because a boom would be short lived if there was such. I think that conservatism is warranted in business circles for a good many years to come. This war is going to help impoverish the whole earth, and dissipate so many assets that even if our apparel is required abroad our production will have to be made to fit the needs of this country until Europe resumes buying power of a normal nature, which will be a good many years hence.

"This dyestuff shortage has been talked about for a year, but the result has not come home to us with any seriousness until just now. I have just learned that the Amoskeag mills have abandoned blue denims entirely. Other goods which are consumed in enormous amounts cannot now be produced because of this lack of colors, especially blues.

"One who is not acquainted with the peculiar conditions connected with Germany's mastery of the dyestuff market is apt to ask why we here in America do not produce our own colors. The answer is that we could, but at a cost of production far above that in Germany, and capital will not care to make the large investments necessary to start such an industry unless there is a satisfactory guarantee that as soon as the war is over Germany is not going to come over here and undersell us. I understand they have in Germany a great many graded scientific schools that turn out in large numbers skillful young men willing to work for very small wages in such industries as the manufacture of colors. These young men contract to work for four years, I am told, for such modest sums as $2,500, or about $600 a year. Although they are graduates of these scientific schools they are practically nothing more than what we here in America would call apprentices, and they are doing ordinary labor at less wages than we in this country have to pay our cheap unskilled labor. The only chance one of these young chemists has to get along in the world is to do better work during his four years' apprenticeship than any of his associates, so all of them are 'on their toes' trying to find some new color, to invent improved methods of manufacture, to perfect in every way the processes of the industry in which they are engaged. With high grade, yet such cheap labor such as is provided by these scientific

schools it is not surprising that Germany has been able to secure such a large share of the world's market for colors.

"Our people could make all the dyestuffs needed if the party in power would give adequate assurance that after the war is over the tendency will not be to neutralize all their efforts through the tariff. We haven't any bright young men willing to work for almost nothing. Germany with her mighty brainy fellows willing to work so cheap would come in here again after the war and take the market away from us unless the American dyestuff industry is protected by a sufficient tariff. It is not because we have not the skill or the knowledge to make colors, but because we must pay so much more for this labor. In the Massachusetts Institute of Technology how many men are there who would be willing to go to work for $2,500 for four years? They expect to make more than that in one year.

"This dyestuff industry is conspicuous just now because everybody knows about it. Yet the United States has been importing only about $15,000,000 worth of colors annually. The field is not large enough to prove any great attraction to capital unless there is adequate assurance that capital is going to be protected."

H. C. EVERETT, a member of the firm of Lawrence & Company, 89 Franklin street, Boston, one of the best known dry goods and commission houses in the East, believes that the cotton manufacturers of the United States should bend all their energies toward holding the domestic market, and while welcoming gladly any "war orders" that comes along, that they should not count upon being successful in holding any important position in the foreign market when the war ends. The shortage of dyestuff he considers the most acute problem facing the textile industry at the present moment, but he believes that American enterprise will solve this problem readily if sufficient time be given and the adminisration provides the necessary tariff protection requisite to the upbuilding of a color manufacturing industry in this country.

Speaking of the general condition of the market today, Mr. Everett said: "Business is quieter than it was at this time last year. So long as the war lasts business in our industry will be of the hand-to-mouth variety. Buyers are taking only what they actually require for their immediate needs, and cutting prices is not going to increase orders. If you offer a man a piece of cotton goods at ten points less than the market quotation he isn't buying it today unless he actually needs the goods. You might as well give him only what he wants and ask the regular market price for it, which he usually is willing to pay. I do not think that the foreign demand for cotton goods is as heavy as some recent statements claim it to be. Some hosiery is being exported, but not enough to have any extensive effect upon the market. It is the domestic market that we must depend upon. When the war is over the manufacturer must watch out to hold even the domestic market, which belongs to us. *Without the aid of a scientific tariff, holding even our own domestic market is something that the manufacturer is going to find very difficult to do.*"

Of the dyestuff situation, Mr. Everett said: "Blues and blacks are the most difficult to obtain. Reds are going to be difficult to get; in fact they are now. I very much doubt if we will be wearing blue serge suits when the ones we have on are worn out unless the war ends very quickly. Attempts are being made here to get out something to take the place of the colors we have been importing from Germany. They are talking of putting up plants and probably they will if we give them time. In the meantime, obtaining colors will be a very pressing problem in the cotton manufacturing industry. The chemical people are going to be very cautious about spending the large sums of money required to start the production of colors in a large way unless there is some prospect of securing a scientific tariff which will protect their investments when Germany once more is an active competitor in this field."

The opinion of Lawrence & Company is particularly interesting because of the wide connection of this firm. Included in the list of large mills for which the firm is selling agent are the Pacific Mills, the Ipswitch Mills, the Boston Manufacturing Company, the Whittenton Manufacturing Company, the Salmon Falls Manufacturing Company and the Merrimack Manufacturing Company.

HORACE S. SEARS of Wellington, Sears & Company, the big Boston dry goods and commission house with offices at 93 Franklin street, finds the current demand fairly satisfactory and prices firm. He anticipates a firm market on cotton, which will result in a general strengthening of prices later on, if the war continues. Mr. Sears' utterances are well worthy of consideration for he speaks with authority as a commission merchant of the widest experience and a selling agent of some of the leading cotton mills, including the West Point Manufacturing Company, the Lanett Cotton Mills, the Brookside Mills, the Booth Mills, the Dixie Cotton Mills, the Suncook Mills, the New England Bunting Company, the Columbia Manufacturing Company and the Lanett Bleachery & Dye Works.

Explaining his views on the raw cotton situation, Mr. Sears said: "I am in the minority in my opinion, but I feel that the facts justify my view of the situation. This year's production of cotton is estimated at 12,000,000 bales. Normally, the world's consumption requires 14,000,000 bales. To supply our requirements this year we shall have to take at least 2,000,000 bales from our reserve. To my mind this will mean a demand for cotton, that will maintain prices at the present level, which is about the cost of production, and which would have been considered low two years ago. Germany needs a great deal of cotton and she is going to get it some way, if possible. If she cannot, or if England declares it a contraband of war, England will doubtless buy the amount of Germany's usual importation. It is, of course, true that the ordinary demand for cotton goods has been curtailed in some ways by war conditions, but, on the other hand, the war has greatly increased the demand for certain lines of cotton goods and this demand will call for at least the usual consumption of raw cotton. Business is now good and I expect to see it continue good or even better as long as the war lasts—and prices, which are firm today, will grow firmer, I believe."

"You are an optimist then in your view of the future outlook for the cotton trade?" asked COTTON's representative.

"No," was Mr. Sears' emphatic reply; "just the other way. I believe that when the war ends the demand will greatly lessen. Foreign competition will be even more keenly felt than it has been in the past. The nations which have been engaged in this colossal conflict will go to great lengths to regain their lost trade; to upbuild their indus-

tries that have been almost wrecked by the war. I expect to see Germany, in particular, make tremendous efforts to regain her markets throughout the world. When the war is over American business will be greatly depressed because of the lack of a tariff sufficiently high to protect American labor. Foreign competition will take away from us much of the export business we now are building up, and the lack of an adequate tariff will cut seriously into our domestic markets. The South American market amounts to little as yet. I think the opportunities there for American cotton manufacturers have been over-rated."

T. O. NICHOLSON, treasurer of the C. E. Riley Company, 65 Franklin street, Boston, said:

"The goods market is quiet and the yarn market demoralized. There are large accumulations in the hands of both spinners and knitters as well as commission houses, and prices at present are about 1½ cents below the parity of cotton.

"The buyers feel that we will see a lower cotton market, consequently are withholding purchasing any more than they actually need. The general trouble appears to be too much politics, and this is borne out by the fact that, regardless of supply and demand to regulate the price, the administration and its following are trying to hold the price of cotton for the benefit of votes. Practically all sight is lost of the fact, by all those who want cotton held, that the Reserve Bank, as well as any other institution, will only loan a conservative amount, and this probably in the neighborhood of 6 cents a pound, so that the farmer has got to figure where the other 2 cents per pound (if cotton is on the basis of 8 cents) is coming from, and should the demand for cotton not come up to expectations, there is likely to be a setback and a further call for additional security, and unquestionably a great many will not be in a position to furnish any, and will be forced to sell their raw material. I am of the opinion that with lower prices, for the raw material, there will be an excellent demand for both goods and yarns.

"The dyestuff situation is, indeed, very critical. Some mills have already closed, while others are operating on a reduced schedule. Substitutes for the imported colors are not proving satisfactory, and the industry, as far as those using colors are concerned, is in a very precarious condition."

A representative of Catlin & Company, the dry goods house with Boston headquarters in 67 Chauncy street, stated that small orders for cotton goods are coming along steadily, but that there is no snap to the demand.

"The margin between the cost of raw cotton and the selling price of manufactured goods is too close," was the way he summed up present market conditions. "The law of supply and demand controls our selling prices instead of the cost of manufacture. I think it is fair to expect firmer prices, however, for colored goods. Colors already have advanced one-half a cent a yard over bleached goods. No doubt the scarcity of dyestuff is going to hit everybody. We have been notified today by one of the biggest manufacturers of colored goods that they will have to cut down on all orders placed, especially blues, and this is bound to result in a firm market for colored goods this winter."

Some opinions of southern manufacturers will be found in the Southern Mill Situation review in another part of this issue.

## TOO MANY LAWS.

Lawyers and jurists will tell you that "ignorance of the law is no excuse." When they say this they do not take into consideration that our national and state legislators alone enacted from 1909 to 1913—62,014 laws.

During these five years 65,379 decisions of the courts of last resort were reported in 630 volumes.

Of these laws 2,013 were passed by the national Congress and of these decisions 1,061 were rendered by the Supreme Court of the United States.

This means that the laws when they were made were not clear and had to be taken to court to be interpreted at the expense of someone, generally a merchant, professional man, tax payer or somebody who is the support of the person that introduces the law.

How would you like to hire a man to work for you and then have him put you to a lot of expense by something that he has done because he had the power to do it?

In addition to the above voluminous line of laws we have not taken into consideration the city ordinances, village, township ordinances, etc., which at a rough estimate, would aggregate about 200,000 more laws.

The main feature of these laws is, if all of them were enforced, every citizen in the United States except perhaps office holders, politicians, etc., would be put in jail for violating them and there would not be enough people outside of jail to support the jails.

How is it possible for a class of citizens to live twenty-four hours without violating one out of one-fourth of a million laws?

In recent years our legislators have been paying a lot of attention to regulating business, and it is growing to a point where a man cannot buy three packages of chewing gum with the intention of reselling it, without consulting an attorney as to whether he is allowed to do this or not without danger of landing in jail.

There are good laws, there are poor laws, there are laws made to "put one over;" there are laws made to tax, and it is growing so that we are pretty nearly licensed to death, taxed to death and lawed to death, and the great wonder is that business has been able to withstand all these things without the entire country transforming itself into a commercial graveyard.

We have approximated it within the last few years and if we do not reach the goal it will be because business interests have been in too good a condition.

When you stop to analyze it, who is the sufferer? Is it the capitalist or the laboring man?

The correct answer is the laboring man.

The capitalist can rest for a few years without occupation but the laboring man cannot rest for more than two weeks before he begins to run into debt.

Capital withdraws from commercial pursuits which bring about stagnation in the labor market and the result is depression from which it takes a long time to recover.

Drastic measures have to be taken to cure this condition and here is one of them:—Retire every man in public office to private life as soon as his term expires as according to the law you cannot "fire" him the same as you do an employee of a corporation, and as fast as they are retired, elect good substantial business men to office.—*Commerce and Finance.*

# Mill Conditions and Market Reviews.

## SOUTHERN MILL SITUATION.

The matter of keenest interest to manufacturers at this time is the cotton crop now about to be harvested, and the price which the staple will bring. That there will be no cotton panic this year seems a foregone conclusion, as it is evident that last year's experience in disposing of the crop and the unwise "buy-a-bale" movement has been a lesson which will not be forgotten soon. The present situation is entirely different from that of 1914, this difference being partly due to the smaller crop, partly in a more highly organized carrying capacity in the South through closer cooperation in banking and credit circles, and partly, in fact largely, to the attitude of the people themselves. "Experience is a dear teacher," and the past year of chastening has brought out a much higher spirit of self dependence in cotton growing communities. The only danger facing the South at the opening of the cotton season is that of haste in marketing the crop. The South has a monopoly of the goods. The reserve banks will give it the power to hold these goods and put them out gradually as prices hold up. It is within the province of southern farmers to close their warehouse doors against a declining market and they may put themselves sufficiently in control of the situation as to prevent a break so often the result of manipulation by cotton bears and an oft-recurring cause of loss to the cotton farmers. Theodore H. Price calls attention to the fact that at least one corporation doing business with the cotton states is arranging to take cotton at 10 cents a pound in settlement of accounts due during the next few months, and others have the same plan under advisement. And in all, the coming fall season promises to be a satisfactory one for the South, which is profiting by a steady diversification of industry.

The dyestuff situation, on the part of those mills requiring indigo and the fast color shades generally is more serious just at present than it has been since the war began. It has now been a year since the cotton mills were faced with the certainty of a cutting off of the supply of dyestuffs and American producers have not yet met the emergency. Hosiery manufacturers are experiencing little difficulty in obtaining adequate dyes for the reason that the vast bulk of the requirements is in the form of blacks, which can be made in this country. The prices, however, are so high as to be prohibitive in many instances. The mills throughout the South that do not make colored goods, or if the colored goods do not require the very fine shades of blue, enough dyestuffs can be had to run them for some little time.

The fine goods mills in and around Greenville are needing dyes, and unless some provision is made to supply the shortage some of them will be compelled to close down before a great while. The mills which are particularly anxious because of the lack of dye material are the Dunean, Judson and Camperdown, of Greenville; the Brogan Mills of Anderson, the Watts Mills of Laurens, and other manufacturing concerns which use considerable dye products.

In talking with M. E. RUDISILL, Superintendent of the Henry River Mfg. Co., Hildebran, N. C., he stated that yarn mills in the South have only been able to make a profit by "spurts" during the past several years. "There have only been two or three short periods in the last seven or eight years," he said, "when a yarn mill could buy cotton and sell its yarn on the same market and make a legitimate profit. Yarn mills which were fortunate in buying cotton on a low market and selling yarns on advances are the only ones that have succeeded in making a satisfactory profit. Those who were unfortunate have lost money. This manner of dealing creates a speculative tendency which should not exist among the mills. The trouble seems to be that the production of yarn has been greater than the consumption, and the only hope, as I can see it, is for the United States to find an export market to dispose of the over-production of the yarn mills of the South, and I hope, and see reasons for believing, that we will have that market in a very short while. I hope for a much better market for the Southern cotton mills after the war is over, or even before the close of the war provided it should be of long duration."

J. W. INGLE, proprietor, White City Manufacturing Company, Athens, Ga., stated that while business is good at the present time, he believed that southern manufacturers would have been in a bad fix from a business standpoint, even without war, because of the present low tariff which he declared is hurting southern mill men more than anything else.

J. W. MORTON, agent for the Princeton Manufacturing Company and the Star Thread Mill at Athens, Ga., also declared it is his belief that present tariff conditions were proving very disastrous to the majority of southern cotton manufacturers.

JNO. F. TIBBETTS, president and manager of the Southern Manufacturing Company at Athens, Ga., announces emphatically that business is good and he believes the prospects for the future are also good.

E. S. TICHENER, president of the Walton Cotton Mill at Monroe, Ga., when seen by COTTON'S representative declared that business was dull in his line. He declared that he thought this period of bad business through which the mills had been passing was caused more largely by the present tariff conditions, than by the war, and he said he believed the business conditions would have been bad regardless of the European struggle. He believes that cotton will bring a better price this fall than last, however, which should tend to improve southern conditions somewhat.

P. F. MERRITT, secretary and treasurer of the Mary Leila Cotton Mill at Greensboro, Ga., declared that business with him was good and with fair prospects for the future. He also believes cotton will bring a much better price this fall than last.

W. A. FOWLER, superintendent of the Mallison Braided Cord Company, Athens, Ga., said business was good in his mill. He has plenty of dyestuffs to last for some time yet and is not particularly worried about future prospects.

GEORGE H. LANIER, vice-president and general manager of the Wellington-Sears string of mills at West Point, Ga., expresses himself as satisfied with the general business

conditions at present and the outlook for the future. He is busily engaged at present with the details of the new Fairfax mill of the West Point Mfg. Company. This good old Virginia name was adopted for the new mill after careful consideration. The fact that there is, at present, no postoffice by the name of Fairfax in the state of Alabama, in which the new mill is located, was but one of the impelling reasons which caused the selection of this name. As soon as the mill is built and started and the mill village established, application will doubtless be made for a postoffice at this place under the name of "Fairfax."

The site for the location of the Fairfax mill, which is about midway between the Langdale mill of the West Point Mfg. Co. and the Riverdale Mill at Riverview, was specially selected so that Lafayette Lanier, Jr., the agent for the West Point Mfg. Co. could also have the Fairfax mill under his general supervision as agent.

W. N. BANKS, president of the Grantville Hosiery Mills at Grantville Ga., advised COTTON'S representative that he was having no difficulty in securing the dyestuff he needed. He indicated, however, that in many instances he had to pay an exorbitant price for the material purchased.

P. E. GLENN, secretary and treasurer of the Exposition Cotton Mills, Atlanta, and secretary of the Georgia Cotton Manufacturers' Association, thinks that the move on the part of England to declare cotton contraband would in no way affect the actual marketing of the crop, inasmuch as cotton has already been practically contraband for a number of months and the situation is entirely discounted by the cotton interests. It was, perhaps, a straw showing the trend of opinion that cotton went up about eight points on the day of the preliminary announcement. Mr. Glenn believes that after the experience of last year and with the Reserve Banks working properly, planters will sell very little cotton under 8 to 8½ cents.

R. T. COMER, who is to superintend the new Hillside Mill at LaGrange, which is under construction by the Callaway-Truitt interests, states that all of the mill cottages at the new mill will be equipped with running water, bath rooms and electric lights. The village will have its own school, churches and private playgrounds for the children and also a park in the center of the mill village. The streets will be paved and lighted and it is the intention of the mill company to make this one of the best villages in the United States. When completed, it will only be rivaled by the village of the Amoskeag Company at Manchester, N. H. It is the intention of this organization to make a bid for first class operatives only and they are making arrangements toward this end. It will probably be six months before this mill will be ready to start.

W. A. CRUTCHFIELD, president, Manchester Manufacturing Company, Macon, Ga., says that he has about all the orders he can handle at the present time, and he looks for business to be still better this fall. Speaking of the cotton situation, he says: "I have been in the cotton business for about 50 years and it is my belief that cotton is going to bring a much better price this fall than last." The mill village at Mr. Crutchfield's mill is going to be repainted and recovered in the near future.

TRACY I. HICKMAN, president of the Graniteville Manufacturing Company, Graniteville, S. C., urged cooperation among the mill men and indicated it as his belief that the present low tariff was responsible for a great deal of the trouble and difficulties that American cotton manufacturers are encountering. When interviewed by COTTON'S representative on present and future business conditions, he said:

"Business for the last six months compares favorably with that of the same period last year—although I am frank to say that for this period in last year, it was not satisfactory. The business for the past six months is by no means equal to business in general for the same length of time in previous years.

"We have within the past two years completed improvements at Graniteville aggregating $250,000 in new machinery, and we do not expect to add anything more in the immediate future. We have made no additions in our mill villages.

"Men who are largely interested in mills, both North and South, believe that ultimately we will get large export trade with the neutral countries which have formerly been supplied by Germany and Austria. England will of course continue to furnish a great many of her customers, but the United States should, to say the least of it, get one-half (if not more) of the business heretofore supplied by Austria, Germany, England and Italy.

"In my opinion, the main thing that is affecting the cotton mills is lack of unanimity of action among themselves and their agents, and unless we get a tremendous demand for goods—which will give the mills more business than they can possibly handle—I am inclined to think that we are not going to see great prosperity until we 'get together.' The prices of goods today are abnormally low, and for no special reason; for as far as I can see, most of the product has been consumed by somebody during the last 12 months, and there is no large accumulation of goods in the hands of either the jobbers, converters, or manufacturers. The people of this country, for self-interest, should use cotton goods for all purposes possible.

"I do not believe that any man's opinion is worth anything on raw cotton. However, a good many people believe that our exports will be larger than they were last year, owing to the fact that the Allies among the warring nations will require so much cotton for ammunition purposes—probably as much as Austria and Germany would use in normal years (about 2½ to 3 million bales) and which they cannot now get on account of England's blockade.

"I have always believed that we should have a tariff commission. The tariff on some goods is too low. I touched on this in my address at the annual meeting of the American Cotton Manufacturers' Association in Memphis this spring."

Asked about the reworking of waste, Mr. Hickman said: "I do not believe that it would be wise for each individual mill to rework its waste. It would be a very difficult matter to keep all of the waste products separate and distinct from the other products, unless you should have absolutely separate mills. A mill that is running on waste, should not run on anything else. I do not know whether or not this would be altogether profitable—and if *everybody* got to doing it, of course it would *not* be profitable, as competition would be too keen. There is not a very large demand for this character of goods."

H. W. CLARK, secretary and treasurer of the Southerland Mfg. Co., Augusta, Ga., indicated that in his opinion the low tariff had much more to do with bad business conditions than the war, and unless something was done to im-

prove tariff conditions before the war was over that it would be impossible for mills in this country to compete with Germany and England and many cotton manufacturers would be seriously injured financially. Mr. Clark's mill has recently installed some new drawing frames, cards, slubbers and speeders.

SAMUEL B. PLATT, superintendent of the Sibley, Mfg. Co., Augusta, Ga., finds that tariff conditions have injured mills around Augusta and unless adjustments are made in the near future, he anticipates that German and English competition will be very disastrous upon the completion of the present struggle in Europe. Mr. Platt also states that he is having considerable trouble securing a sufficient amount of dyestuff and is conserving his present supply as much as possible.

T. B. FLOYD, JR., president of the Putnam Mills & Power Co., at Eatonton, Ga., finds business fair and prospects for the future fairly good. Mr. Floyd's company has just completed a new concrete dam which will double the power plant capacity of their mills, and they are considering doubling the capacity of the mill itself in the near future.

R. K. MATTHEWS, superintendent of the Imperial Cotton Mill at Eatonton, Ga., says that business at his mill has been fair during the past few months and he is looking for still better business this fall.

Some further opinions on the dyestuff question and the general situation in the textile industry from a New England standpoint, may be found in the special article in the general department of this issue prepared by our staff correspondent.

The following are noted among the additions, changes, etc., in hand at present, or contemplated:

The mill at Millen, Ga., which we reported last month as having changed hands, has been completely overhauled and the village repainted and repaired. This mill is operating full time now and has been for several weeks past.

The Macon Knitting Co., at Macon, Ga., manufacturers of mixed, fancy, black and tan full seamless hosiery, reports good business conditions and more orders than they can handle.

The Covington Mills, Covington, Ga., are to install 100 new Draper looms for the manufacture of shade cloth. Extensive repairs are also being made at the Covington mill village, where they are having painting and recovering done to many of the houses.

The Southern Manufacturing Co., Athens, Ga., is to install 108 new Lowell looms in the near future. This mill is building a new cloth room 100 x 80 feet, in which will be installed some new cloth room machinery.

The Princeton Mfg. Co., Athens, Ga., has just installed two new cards and attached the Duplex system on ten others.

The Holland Mfg. Co., has rented floor space from the Athens, Mfg. Co., Athens, Ga., and intend starting a knitting mill at that place. They have a capital stock of $100,000 and the privilege of increasing this to $300,000. Archibald C. Meldrum is president and T. W. Woodham is manager. They are preparing the building for installing the machinery which will consist of approximately 100 knitting machines for hosiery, with the necessary rib top and seaming machines. They announce that they intend to do their own dyeing and finishing and will install the necessary dyeing and finishing machinery in the near future. They are also making inquiries for box machinery for the manufacture of pasteboard boxes for packing their product and announce their intention of purchasing an entire equipment for this purpose. It is the declared intention of the officers of this company to make a special drive on export hosiery.

The Star Mill at Forsyth, Ga., which we reported some time ago as having been taken over by R. P. Brooks and associates, is being repainted and thoroughly renovated. The name of this mill has been changed to the Forsyth Cotton Mill and the following new machinery has been bought and is being installed. Three Kitson pickers, eighteen Whitin cards, two Whitin drawing frames and two Whitin speeders. One twister will also be added, although this machine has not as yet been bought. R. P. Brooks is president and W. H. Newton superintendent and buyer. This mill will probably start about the first of September and the product will be yarns 4's to 14's.

The Ensign Cotton Mills at Forsyth, Ga., is practically doubling its capacity. The new addition to the mill is 75 x 145 feet two stories high. This mill is also constructing a new warehouse, and a new opener room. Twenty new cottages have already been added to the mill village as well as a new church and school house. The machinery for the addition has already been purchased from the Saco-Lowell shops and includes six thousand spindles, forty cards, and three pickers. They report that it is improbable that the new machinery will start running before the first of January, 1916.

The Aldora Mills at Barnesville, Ga., are replacing a number of old plain looms with 354 new Draper dobbies. Superintendent W. O. Tallent reports business to be pretty fair at his mill.

The Columbus Mill of the Bibb Mfg. Co. is well stocked with orders and is running night and day.

The Eagle & Phenix Mills, of Columbus, Ga., are running on half time, because of dye-stuff shortage.

The Columbus Mfg. Co., Columbus, Ga., are running full time and report plenty of business.

The Hamburger Cotton Mills, Columbus, Ga., which have been shut down since last October, will start operation again within a few weeks. Guy Garrard is the manager, and is having the plant thoroughly overhauled and repainted. The new machinery equipment being added is as follows: 1 Creighton opener, 3 Kitson pickers, 24 cards, 2 slubbers, 3 intermediates, 10 speeders, 40 deliverers of drawings, and 16 tape driven spinning frames (all Saco-Lowell). This new machinery equipment also includes 24 groups of Universal winders of 6 spindles each and 4 Foster winders. The product of the mill will be hosiery yarns and warps.

The Albany (Ga.) Cotton Mills have recently installed two new Saco-Lowell spinning frames and have just completed a new brick waste house.

It is reported that the Poulan Cotton Mills, at Poulan, Ga., expect to install two cards and two or three spinning frames in the immediate future. Business is reported to be good and the mill officials are considering the advisability of doubling the capacity of the mill. This has not been fully decided upon as yet.

The Norcott Mills Company is the name of the new cotton mill to be built at Concord, N. C. Instead of a capital of $100,000, as was first proposed, the stock in the new mill has been increased to $175,000. C. W. Johnston, of Charlotte, F. J. Haywood and W. G. Broadfoot, of Concord, are the promoters of the new mill, and will have controlling interest. Contract for the machinery has been closed.

The Conneross Yarn Mill, Anderson, S. C., will install

additional machinery and change present equipment so as to manufacture asbestos yarn. They now manufacture rope and mop yarns.

Considerable new machinery and equipment is being added or contemplated by cotton mills in Texas, among them being Dallas Cotton Mills, Guadalupe Valley Cotton Mills, Texas Cotton Mill Co., Bonham Cotton Mills, Postex Cotton Mills and Brazos Valley Cotton Mills. Reports from manufacturers in that state are very encouraging for future business.

The Dixie Cotton Mills, Mooresville, N. C., are planning the addition of several thousand spinning spindles, with complementary machinery. They now operate 6,000 spindles on hosiery yarns.

A 5,000-spindle addition is to be built by the Elk Cotton Mills, Fayetteville, Tennessee. The company is now operating 10,000 ring spindles, and 5,000 twister spindles on yarn production.

The Avondale Mills, of Birmingham, Ala., are planning the installation of considerable new machinery, from cards to spinning and twisters, inclusive. The new machinery is to be used for working waste.

The Woodlawn Mfg. Co., Mt. Holly, N. C., are adding to their carding capacity by the addition of ten new cards.

The Board of Trade, Murfreesboro, Tenn., is promoting the organization of a $100,000 company to build a hosiery knitting mill.

The Edenton Cotton Mills, Edenton, North Carolina, will add several thousand new spindles to their plant at an early date.

New roving machinery is being ordered by the Fulton Cotton Mills, Athens, Alabama; they also expect to buy eamless winders.

The Broad River Mills, Blacksburg, S. C., contemplates an increase of capital and the addition of 10,000 spindles. No contracts made as yet.

Neville Bullitt, Keller Building, Louisville, Kentucky, is planning to establish a knitting mill at that place.

D. W. Warlick, Secretary of the Dudley Shoals Cotton Mill Co., Granite Falls, N. C., is planning the organization of a company to build a cotton mill, the proposed company to have a capital stock of from $200,000 to $300,000, and the plan is at present to build a mill of 15,000 spindles.

Robinson Mfg. Co., Charlottle, N. C., is planning to add 4,000 new spindles with accompanying machinery, order for which has been placed.

The Acme Hosiery Mills, Asheboro, N. C., are planning to increase their capacity by the addition of about 100 knitting machines with accompanying equipment. They will erect a new building for this additional machinery.

The Royal Bag & Yarn Mfg. Co., of Charleston, S. C., contemplate the addition of 100 machines for making seamless bagging. They state that they will be obliged to do this to meet increasing demand for their goods.

James Gray, of Johnson City, Tenn., who has been interested in the establishment of a hosiery mill at Hendersonville, N. C., has met with considerable success in this undertaking, and it is believed that the plant will be built if citizens of Hendersonville will donate a site. If the mill is built the product will be misses' hosiery, and the finishing will be done by the Freeze-Bacon Hosiery Mills of that town.

The Cherry Cotton Mills, Florence, Alabama, have recently placed an order for several thousand new spindles. They now operate 11,000 spindles on 6's to 40's.

New machinery is being installed in the Kincaid Mfg. Co., Griffin, Ga., and is expected to be in operation early in September. The new equipment includes 8,500 spindles and preparatory machinery, 160 looms and 2 slashers. This will practically double the output of the No. 2 mill on cotton towels.

There will be no material present increase in the capacity of the Maysville Cotton Mills, (Kentucky), such as was first planned. Later on the capacity is to be largely increased. Twines, lines and coarse cotton yarns are manufactured.

The Cohankus Mfg. Co., Paducah, Kentucky, contemplates the addition of some new machinery. They now operate 6,000 spindles on ropes, lines and cords.

The Arlington Mills, Gastonia, N. C., will build a 2-story addition to their mill for the installation of new textile machinery.

## NEW ENGLAND MILL SITUATION.

The fine goods mills of New England have been doing relatively better than print cloth or colored goods mills. They are better provided with forward business and they are able to move their stocks as they accumulate. The colored goods mills are feeling the effects of the dyestuffs scarcity in a very serious way. The large Amoskeag Company's plants are all closed for three weeks, and reports are current that after another three weeks of operation there will be a further stoppage. There is no dearth of orders for goods of a staple character that would force these plants to close although it is conceded that prices are not high enough to permit of a satisfactory profit.

Other colored goods mills are curtailing their output steadily and must continue to do so until consumers will take the substitute colors that can be supplied. Some progress is being made in that direction but it is slow. Some of the printers are able to get all the blacks they require and a few have been able to pick up supplies of indigo in sufficient quantities to complete the orders in hand. Many other colors are being exhausted steadily. Substitutes are being tried out and in some instances they are giving satisfaction. As a rule the printers think they will be forced to close a substantial part of their plants before the end of the year and for that reason they are not buying gray clothes in normal quantities. This is affecting the print cloth and convertible markets adversely.

New England manufacturers are generally disappointed by the slow development of trade in staples with the jobbers. The latter say they are doing a fair business and the Western jobbers are particularly sanguine of fall distribution. But they are only sending in such orders as they require to fill the nearby business they are doing and are very slow or conservative about committing themselves for the long future. Most manufacturers have been expecting that cotton would drop to around 8 cents a pound. They are buying only the cotton they require and are disinclined to stock up at current levels. As most of them were fooled on cotton last year and did not get in when the staple was near the lowest, they are willing to admit that cotton may fool them again this year. They will not be at all dissatisfied if cotton does not run above 10 cents a pound, which price, they say, will give them a very good opportunity for home and export distribution.

The anxiety for new business which has developed in the past month in the large markets has led to lower prices

than mills expected on goods. Some manufacturers are sanguine enough to think that goods will rule stronger before the middle of September and there are many of them who contend that the time is close at hand when cotton goods prices will not be influenced so much by the price of the staple as by the restricted supply of merchandise. Nothing in the print cloth outlook warrants such hopes as it is well understood that Eastern and Southern print cloth mills have been accumulating stocks in the past few weeks. Fall River alone is credited with carrying nearly 2,000,000 pieces of all kinds of print cloth yarn goods, mostly odd styles.

The demand for bleached fabrics has been larger than usual and the distribution has broadened very materially this year in consequence of the use of wider skirts and more underwear by women. Yet the competition for business on the low counts has brought prices down to a basis of 4½ cents for 4-4 64 x 60's, which most merchants contend is unprofitable. The standard jobbing brands, such as Lonsdales, Hills, and Fruits, are holding steady and are comfortably under order. Wide sheetings have been relatively steadier than other cloths until recently. It is now apparent that many additional wide looms are being added to the equipment in the country.

The new Naumkeag mills are getting into operation and Pequots are coming into the market more freely. The Utica company is adding to its equipment, and the supply of Pepperell sheetings is apparently increasing. In any event, taken in conjunction with the increasing supplies of wide sheetings from the South the markets are not quite as firm as they were. Pillow tubings are holding very steady.

Prices on dress ginghams for the spring season are not to be announced by the Amoskeag Company until after Labor Day. This is much later than last year's announcement of prices. Several of the southern lines and some of the eastern lines of 7½ cents dress ginghams have been sold subject to price making, later on, probably when the Amoskeag has announced what it will do. Owing to the action of the Amoskeag in the matter of chambray shirtings, that is, reducing the price ¼ cent a yard, and later on cutting down the orders received one-third, there is considerable apprehension as to what course the dress gingham markets will take.

The shortage of indigo staple ginghams is becoming more pronounced in the markets. Trade in staple ginghams is fair but in no wise as active as agents thought would be the case. Most of the jobbers are content to order ginghams as they need them. Some jobbers still have ample stocks and others are running short. The prolongation of price naming for spring by the Amoskeag has had the effect of giving jobbers a chance to reduce the stock of goods in hand, but it has unsettled manufacturers of other lines.

The large printers are busy. Both the American and Pacific works have been operating in full on a variety of goods. The Algonquin works has also been busy and is adding to its equipment. Yet printers declare that they are rapidly coming to the place where their customers must accept substitute colors or the machines will have to be stopped. The American Printing Company sent out an announcement warning its customers of the serious situation on staple prints, due to dyestuffs shortage, and in a few days some large orders came in from the jobbing trade. All the blanket orders that were on the books were confirmed and jobbers hurried to specify just what they wanted in colors. But aside from this feature the business in printed cloths of a staple character has been small. The printers are busy on a variety of fabrics, many of them in the finer yarns.

Thus far the New England mills are getting only a moderate share of the new export trade. Certain of the duck and denim mills are busy on export orders and a fair share of printed goods for various countries is being shipped.

Some of the gingham mills are selling a few goods for export and it is true that a great many fine and fancy cottons are being sold through converters. But the large volume of export trade in cottons which was predicted freely a year ago has not materialized so far as many mills are concerned.

Trade in napped cottons is steady. The stocks of large mills are negative. It is not possible to accept considerable business that is offered on dark colored blankets and flannellettes owing to the scarcity of dyes. Occasional sales of napped cottons for export are heard of but they do not bulk large in the total output.

The fine goods mills are busy on sheer fabrics of fancy construction and plain and fancy goods suitable for skirts and suits. The business on shirtings and madras waistings offered to large mills has been better than in any recent year, so that on the whole the fine goods mills are getting business in satisfactory volume. The sheer lace cloths, voiles, organdies, in fancy weaves of all descriptions, and the very full quantities of dotted and figured sheer cloths, make a variety and volume of trade for the fine goods mills quite unlike anything experienced in recent seasons. The white goods vogue this season has also led to the placing of large orders for next year. In heavy cloths, such fabrics as gabardines, beach cloths, piques, reps, and cords of many fancy descriptions, in addition to the staple poplins and twills, make a very full list for some of the concerns that are able to handle goods of this class.

The labor situation has improved to the extent that less is heard of wage advances. But there is a scarcity of really good weavers and in many mills the percentage of "seconds" made is far above normal. In several instances there are many looms idle because manufacturers cannot get satisfactory weavers to handle the fine fancy business that is offered.

Business with the bleacheries has been steady and some of the finishing companies are quite active. Others are restricted in their business by the dyestuffs shortage. Some of the yarn mills, especially those making special qualities for the men's wear trade, are well supplied with orders. The mills making tire yarns are also busy. The mills making staple qualities of fine combed yarns are not doing very well.

The machinery concerns continue active. In fact they are generally better supplied with business than for years past and there is every prospect that they will have plenty to do for a long time to come. There have been tenders received in the past month of machine business from China and South America. With the English machinery plants commandeered by the government the American cotton machinery plants are getting business offered to them by people who must have the machines at some price. Some of the loom works are so busy that they cannot guarantee new deliveries earlier than three months away. The spinning mills are particularly busy.

## COTTON COMMENT.

BY H. AND B. BEER, NEW ORLEANS.

New Orleans, August 23rd, 1915.

Considering all the unfavorable features brought to bear, market values have ruled comparatively steady, showing little change compared with one month ago.

The drouth in Texas and in other sections of the belt was effectually broken last week by the coming of general heavy rains, but the precipitation was excessive in the Mississippi Valley states, and a hurricane swept the eastern half of Texas, doing considerable damage to open cotton.

The heavy rains are expected to prove beneficial to late cotton, particularly in Texas, as the plant will take on new growth and bolls will fill out, but final results as to the yield being increased will depend on the date of frost. In the meanwhile the early matured portion of the crop in the central and western portions of the cotton region has been lowered in grade by the rains, and much of it has been blown away. Picking, marketing and ginning has been retarded west of the Mississippi.

Now that the Allies have declared cotton contraband of war, some surprise has been occasioned by the steadiness of the market. This is explained by the belief that the Allies, Japan and America will increase their takings of American cotton this season to such an extent that the loss in the way of exports, usually about 2,000,000 bales, to Germany and Austria, will be more than offset. In other words indications are that even with Germany and Austria cut off, the world will consume more of American cotton this season than last season's 14,134,000 bales.

Therefore, with prospects for a crop of 4,000,000 to 5,000,000 bales smaller than last year's 17,000,000 bales, the world will likely have need for every bale made this year, as well as for the surplus carried over from last year, perhaps at a higher average price than last year's 7.94 cents in the local market.

In order to show the status of the cotton situation, present and prospective, we present the following comparatibes for consideration:

| | This Season. | Last Season. |
|---|---|---|
| World's visible and invisible August 1st | 5,329,000 | 4,033,000 |
| Unmarketed of old crop | 1,888,000 | 300,000 |
| Indicated crop | 11,970,000 | 17,004,000 |
| Estimated total available | 19,187,000 | 21,337,000 |
| Estimated world's consumption | 15,000,000 | 14,134,000 |
| Indicated visible and invisible end of year | 4,187,000 | 7,203,000 |

The indicated world's available for this season of American is about 2,150,000 bales smaller than last season, and the indicated consumption this season is 866,000 larger than last season, which, if realized, would leave the world with less of American cotton at the close of this season by 3,016,000 bales than was accounted for at the close of last season.

The fact that the last Bureau report was 75.3 against the ten year average of 78.5, with a reduction in acreage of 15.7 per cent and less fertilizers used this year by 41 per cent, surely points to a short crop this year. The South is aware of these conditions, and as it has the backing of southern merchants, southern bankers and the Reserve Banks, it feels confident in its ability to command a fair price for this year's crop. At the moment the price of the staple in the interior is down to about the cost of production, or about 8½ cents basis Middling.

There is more reason for an advance later in the year than there was last season, as business has been adjusted to meet conditions brought about by the European war. Thus far this season, or since August 1st, spinners of the world have taken 647,000 bales against 198,000 last year, and this ratio of increase will likely continue for months to come.

## THE YARN MARKET.

The cotton yarn market during the past month, while comparatively quiet, has been gradually improving and in some lines the prices have been stiffening under larger demands. Efforts on the part of cotton yarn houses to cover short sales in both skeins and warps served to force additional advances in the New York market. Prices on 30's 2-ply warps advanced sharply and 20's 2-ply warps also showed some gain. Upholstery counts in 3 and 4-ply 8's moved up and other weaving counts are being held at firm prices. The fear of cheap cotton this fall does not appear to have any effect upon the market at this time.

The opening of the month found the Philadelphia market slow, and while there was some good inquiries the buyers' ideas of values were so low that the spinners would not consider them. The dyestuff situation continues to be a serious menace in many lines. There was a light demand for combed yarns and spinners of fine 2-plies were holding out stiffly for their prices. Inquiries for carded knitting yarns were showing much improvement and this improvement continued from week to week.

Some dealers were making complaints about the brand of business courtesy shown by some of their southern correspondents who refused to quote promptly on telegraphic inquiries, thereby, in many instances, losing the sale to the dealer and the mill. Courtesy in all business is well worth while and should be practiced assidiously.

Later in the month, while a very light demand for single combed yarns prevailed 2-ply combed yarn mercerizing twist and mercerized yarns held very strong. Weaving yarn prices were tending upwards, although no large quantities were sold in the Philadelphia market. Weaving lines of all kinds show an improvement and men's wear manufacturers have booked large orders. Knitters are buying freely, although their ideas of prices are generally rather low.

Inquiries have been received during the month for knitting yarns for export accounts, but so far as is known no actual sales were made. Buyers for South American accounts were making inquiries, but in a good many instances yarns wanted were not available, particularly colored yarns.

The following are recent quotations in the Philadelphia market:

**Southern Single Skeins.**

| | | | |
|---|---|---|---|
| 8s | 14 @15 | 20s | 16 @16½ |
| 10s | 14½ @15 | 24s | 17½ |
| 14s | 14½ @15 | 26s | 17½ @18 |
| 16s | 15 @15½ | 30s | 20 @20½ |

**Southern Single Warps.**

| | | | |
|---|---|---|---|
| 8s | 14 | 24s | 17½ |
| 10s | 14½ @15 | 26s | 18 |
| 12s | 14½ @15 | 30s | 20½ @21 |
| 14s | 15 | 40s | 25 @27 |
| 16s | 15½ @16 | 50s | 33 @34 |
| 20s | 16½ | | |

**Carpet and Upholstery Yarns in Skeins.**

| | | | |
|---|---|---|---|
| 9-4 slack | 15 @15½ | 8-3-4 hard twist | 13 @13½ |
| 8-4 slack | 15 | | |

**Southern Two-Ply Skeins.**

| | | | |
|---|---|---|---|
| 8s | 14 @14½ | 24s | 18 |
| 10s | 15 @15½ | 26s | 18½ |
| 12s | 15½ | 30s | 19½@20 |
| 14s | 14½@15½ | 40s | 25 @27 |
| 20s | 17 @17½ | | |

**Southern Two-Ply Warps.**

| | | | |
|---|---|---|---|
| 8s | 14 @14½ | 24s | 18 @18½ |
| 10s | 14½@15 | 26s | 18½ |
| 12s | 15 @15½ | 30s | 19½@20 |
| 14s | 16 @16½ | 40s | 25 @28 |
| 16s | 16½@17 | 50s | 33 @34 |
| 20s | 17½ | | |

**Northern Two-Ply Carded Peeler Skeins.**

| | | | |
|---|---|---|---|
| 22s | 20½@21 | 36s | 25 @25½ |
| 26s | 22 @22½ | 40s | 26 @28 |
| 30s | 23 @23½ | 50s | 34 @36 |

**Two-Ply Combed Peeler Skeins.**

| | | | |
|---|---|---|---|
| 20s | 24 @24½ | 50s | 38 @42 |
| 24s | 25 @25½ | 60s | 46 @51 |
| 30s | 29 @31 | 70s | 54 @55 |
| 40s | 34 @35 | 80s | 61 @63 |

**Southern Frame Spun Yarn on Cones.**

| | | | |
|---|---|---|---|
| 8s | 14 @14½ | 20s | 17 @17½ |
| 10s | 14½@15 | 22s | 17½@18 |
| 12s | 15 @15½ | 24s | 18½@19 |
| 14s | 15½@16 | 26s | 19 @19½ |
| 16s | 16 @16½ | 30s | 19½@20½ |
| 18s | 16½@17 | | |

**Northern Mule Spun Carded Yarn on Cones.**

| | | | |
|---|---|---|---|
| 10s | 16½@17½ | 22s | 20½@21 |
| 12s | 17 @17¾ | 24s | 21½@22 |
| 14s | 18 @18½ | 26s | 22 @22½ |
| 16s | 18½@19 | 30s | 22½@23 |
| 18s | 19 @19½ | 40s | 26 @26½ |
| 20s | 19½@20 | | |

**Northern Mule Spun Combed Peeler Yarn on Cones.**

| | | | |
|---|---|---|---|
| 10s | 21 @22 | 22s | 24½@25½ |
| 12s | 22 @23 | 24s | 25 @26 |
| 14s | 22½@23½ | 26s | 25½@26½ |
| 16s | 23 @24 | 30s | 29 @30 |
| 18s | 23½@24½ | 36s | 33 @34 |
| 20s | 24 @25 | 40s | 35 @36 |

## THE KNIT GOODS MARKET.

Mills on almost the entire range of cotton hosiery are eager for business, and in some quarters ruinously low prices have been named recently. Mercerized and lisle goods are coming into better demand, notably women's and misses'. The trend, however, continues toward fibre silk, notwithstanding the difficulty of obtaining supplies and the continuous price jumps. Fibre of 150 deniers, A quality, is quoted at $2.30 a pound by the Viscose Company, an advance of five cents since last month.

Low end cotton half hose is believed to have struck about the lowest price level possible. While some mills are getting 52½ cents a dozen for 144 needle 13 ounce stock, a few are accepting 47½ net. Fifty cents and thereabouts is the prevailing price for 84 needle two-pound goods. A Reading, Pa., manufacturer who some weeks ago booked an order for 8,000 dozens mercerized, 13 ounces, at $2.20, neglected to cover on yarns and dying at the time the order was accepted, and finds now that, in view of advances, he stands to lose four cents a dozen. Mills believed to be wanting employment were asked to take on portions of it to cover overhead costs, but, it is stated, no mills on that particular line were in such straits that they were willing to help out at the price named. The manufacturer is game, however, and says he will fill the order and pocket his loss.

There is a decidedly improved feeling as to cotton hosiery among both mills and mill agents. Export trade is absorbing much of the business in medium to fine lines, and there is better inquiry from domestic buyers. Business in knitted goods, it is shown, is devoid of snap, and as jobbers in the main have been fairly successful in having hand-to-mouth orders filled, it is feared that same policy will be continued, at least so long as business believes it sees a cloud of uncertainty.

The feeling of optimism is predicted eagerly on confidence in the farmer. Crops have been abundant, and those engaged in harvesting them have been too busy preparing for turning their products into dollars to think about shopping. So soon as the crops are out of the way, it is freely predicted, there will come from the agricultural sections a demand that will find jobbers and retailers short, and as mills, so far as is expedient, are also pursuing the hand-to-mouth policy, it may not be so easy a month or two hence to have goods forwarded by express a day after the receipt of an order by wire.

The disposition among manufacturers is to accumulate no stock, except staples, and agents are counseling such a course. A Philadelphia manufacturer last week was advised by his New York agent to shut down rather than pile up a stock of misses' hosiery. His letter said: "There is not much prospect of getting quantity business just now for immediate or spring." The letter was accompanied by a sample of misses', mercerized, said to come from a southern mill, which quoted one dollar a dozen for size 7, five cents rise and fall. The manufacturer in question says he would rather shut down than meet that price.

While war orders are no longer a factor in the hosiery trade, there is an increasing demand for foreign civilian use, and it is generally admitted that export business is the main dependence of the hosiery industry. London, France and Spain are reported buying freely, and substantial business is being booked for South America, South Africa and Australia, chiefly for mercerized and silk stock, from cheap to fine, almost exclusively in seamless. Obviously a tremendous business in seamless goods is being established abroad, in quarters where formerly Germany controlled the market with full fashioned. In fact, according to concerns supplying machinery, few if any full fashion machines are being installed.

The movement toward the seamless is held as accounting for the springing up of so many small mills, which become the bane of some of the older establishments. It is pointed out that the small village factory, operated, possibly, within the owner's family, is regarded by the owner as a satisfactory investment if it nets him but a village salary, and taking this view of it, he is in a position to undersell some more pretentious establishments. Here, it is asserted, is where price cutting usually begins, more especially in underwear.

This contention cannot be given a broad application, however, as is instanced by a 10-machine factory recently started in Philadelphia. Unable to get business in the line which he set out to make, the owner devised a 13-inch boot fibre silk stocking to retail at a quarter. His first order was for 25,000 dozens, and he has just had his knitting machines turned over at a cost of $48 per machine. Also, he says the order will show a substantial profit.

What will be the effect upon the hosiery market of the action of Great Britain in declaring cotton contraband, has been asked. In the opinion of John M. Given, a well known mill agent, on Leonard street, New York, this declaration will have no adverse effect. The embargo was discounted weeks ago, he says, and he believes Great Britain has taken or will take steps for preventing any serious disturbance of the cotton market. It was feared in some quarters that jobbers might make contraband cotton a pretext for deferred buying or that the British proclamation would precipitate confusion from cancellations of orders, which followed promptly the slump in cotton one year ago. The primary trade entertains a more optimistic view. Germany, it is held, was importing an infinitesimally small quantity of cotton, while the Allies are buying more heavily than ever.

for use in explosives. It is believed, therefore, that cotton manufacturers will suffer no setback or further downward price revision, and that in hosiery and underwear, while a few mills are on short time and others eking out an existence, the fall months will witness an all round brightening up. In anticipation of an improvement, mills on much wanted lines, notably low end balbriggan underwear, are talking of advances, while prices already have been marked up on fibre silk hosiery. A line jobbing at $1.92½ a dozen has been advanced to $2.02½.

Hope that there will come relief from the dye stringency has been encouraged by the successful demonstrations of a direct fast black brought out by Dr. I. V. Stanley Stanislaus, of Philadelphia. The new black, of a napthalin base, embodying no logwood, was given a public dyehouse test at the Taubel Brothers' Hosiery Mill, and chemists, dyers and manufacturers pronounced it a success so far as fastness and color were concerned. They, however, questioned the chemist's ability to obtain the crudes and intermediates. On this phase encouragement was given by a representative of the General Chemical Company, who said the output of benzol is increasing day by day and that as the demand for coal tar products becomes greater, the supply will be augmented.

Dr. Stanislaus, a graduate of the Federal Trade School of Switzerland, is professor of industrial chemistry at Temple University, Philadelphia, and an instructor in Hohnemann College. He was called in by H. A. Berendsen, Bangor, Pa., to perfect the Aimes black, shown in July. He at once discarded the Aims production and went to work on an exclusively coal-tar basis. A $2,000,000 company has been incorporated to manufacture the Stanislaus black, and has taken an option on a 12-acre river front property near Philadelphia.

# COTTON MANUFACTURING.

## SUGGESTIONS ON WARP PREPARATION.

BY "ALBERT".

SPOOLING.

Spooling is a process which is deserving of more attention than it receives in many mills, probably because its importance is not fully recognized, but it is a process which has a great deal to do with how the warp yarns will run on the warpers, slashers and looms, and with the quality of the cloth. To get the best results, the machinery must be kept in good order and the operatives must be trained to do good work.

It is tiresome work to spool, not so much because the work is hard or heavy, as because it is monotonous, and there is so much of a sameness to it, probably more so than any other work in a mill except drawing-in. As very little skill is required, and an operative can learn to do the work quickly, spooler tenders, as a rule, are not the most intelligent class of help in a mill, which makes it even more important that the overseer and second hand should be particular to see that the work is done right, and that the machines are in the best possible condition. Knot-tying machines are now used in practically all mills, and this has greatly reduced one source of trouble from the spoolers, that is, bad knots. It is much easier to teach an operative to use a machine, than to teach him to make a good knot. However, it is possible to make poor knots even when a machine is used and one of the most prolific causes of trouble where a machine is used, is when the operative drops the end too quickly after the machine has tied the knot, and the result is that the knot may not be drawn up tight, and may slip, or a kink be put in the yarn.

These knot-tying machines are expensive, and a cupboard or drawer should be provided, where they can be kept when not in use, and they should be gathered up just before stopping time, examined to see that they are in good order, locked up until again needed. Care should be exercised in using these machines and they should be well oiled and there should be enough extra knotters so that when any of them are being repaired, the spooler tenders can use the extra ones.

On the spoolers, the spindles should be carefully oiled and cleaned, new bands put on as soon as they become slack or come off, lifting rods and guides kept free from lint and not too much oil put on to make the lint stick to them. The mangle gear should be cleaned often enough so that the teeth will not become clogged up. Cylinder bearings should be well oiled. A gauge should be used in setting the thread guides and they should be set so as to let the yarn pass through with very little friction, but at the same time they should be close enough to catch any lumps or loose lint which may be on the yarn, and they should be set so as to guide the yarn onto the spools so that there will not be a soft place next to either head of the spool. This is important as the yarn will not run off well on the warpers, if there is a soft place, because the yarn is then liable to pull in and break. A well built spool is one that is barrel shaped, that is, larger in diameter at the center and tapering towards each end, and equally hard all over. This can be obtained if the traverse is the right length and the guides properly set. The bobbin holders should be kept lined up and all at the same angle, for if there is any one thing in a mill that can look more slovenly than another, it is a spooler frame with no two bobbin holders set at the same angle. Experiments should be made to determine just what is the best angle to set them, because they should be set so that the bobbins will not have a tendency to fly out, and, also, so that the tension will be as nearly uniform as possible, no matter what part of the bobbin the yarn is being unwound from. The wires should be the right weight for the yarn to be spooled, and when any of the wires become bent they should be replaced or bent back to form. Spools that have broken or split heads should not be used, as they are not only liable to make bad work but also to injure the operatives' hands.

Another thing to look out for is the condition of the boxes or baskets used to hold the spools. They should be free from slivers and tack heads or anything that the yarn can catch onto and break. One of the hardest things to combat in spooling, is to keep the spooler tenders from cut-

ting yarn from the bobbins, and the man in charge of the spooling should complain very quickly, if he is getting more than a normal number of bobbins from which the yarn will not all run off freely on account of bad doffing. If there are not very many of these bobbins, it is easy to get the spooler tenders to run them off on the waste spindle, but if there are a great many, the temptation is strong to clean them off in the easiest way—that is with a knife. The waste balls should be removed from the spindles by someone other than the spooler tenders, as these balls are apt to be hard to pull off, and the spooler tender should not be required to do it. Snarled bobbins should be removed at least once a day. Some of these bobbins can be spooled by running them from a live spindle instead of trying to run them from the bobbin holder, while others can be tied up when snarled over the end of the bobbin (providing there is no serious objection to the extra number of knots in the yarn, and this will depend largely on the class of goods that the yarn is going into); still others can be made right by pulling off a layer or two by hand, and what cannot be used at all should be cut off so as to injure the bobbin as little as possible. Full spools should not be allowed to accumulate on the creels to such an extent that there will be danger of them falling off, as this is liable to damage the spool and yarn, and also upset the guides and holders and possibly injure the employee. If the spooler tenders are required to get their own part-filled spools, they should be placed so it will be convenient for them to do so. Spools and bobbins should be kept off the floor and bobbin conveyor belts should be kept in good working order and the rolls free from an accumulation of waste, which not only makes them run hard but also ruins the belt.

Spooler tenders are usually paid by piece work, that is, either by being paid a given amount for taking care of all the yarn from a certain number of sides of spinning frames, or by the pound. Instead of weighing the yarn, boxes or baskets are usually used to measure a given quantity, and this quantity represents a certain number of pounds, net, of yarn. Neither of these systems are perfect and depend too much on averages which are liable to vary considerably. With the first named system, a fixed amount is paid for a given number of sides, regardless of whether the work is running good or bad, or whether there are good spinners on the sides or not, and poor spinners or bad running work will make a good deal of difference in the number of pounds produced, and consequently in the cost of spooling. With the other system, much depends upon having some one to measure the yarn who is thoroughly reliable, and it is difficult to get the right man for the price that is ordinarily paid for this class of work, and it would be money well spent to pay enough for this work to be sure of getting reliable service. Supposing that a man is paid $1.00 to $1.25 per day for measuring out, say, 15 boxes each for 12 spoolers, or 180 boxes per day, and that these boxes are supposed to contain 25 pounds net, at 10 cents per box for spooling, and that by not filling the boxes quite as full as they ought to be, the boxes only contain 24 pounds, the result would be that 72 cents a day would be paid for spooling for which no yarn was spooled, and the company would be money in pocket to pay $1.50 or more per day, if necessary to keep a man on this work who was absolutely trustworthy. As one pound of yarn would only mean 5 or 6 bobbins in most mills, it will readily be seen that there can be a loss of several pounds instead of one, from a 25 pound box, without it being noticeable or attracting attention. The boxes should be measured frequently, and not allowed to become smaller than standard on account of wear and the top being chipped off. Another reason for having a reliable man to measure out the yarn is because some spooler tenders have very good imaginations, and sometimes really think that they have spooled more boxes than they have been given credit for, and if they can bluff the man who gives out the yarn into giving them credit for another box or boxes, they are so much in and the company is so much out, and unless the man is one that can be depended upon, he is apt to give in to the spooler tender rather than have the spooler tender complain to the boss and have a row about it.

In general, the overseer in charge of spooling, should recognize the importance of, and pay particular attention to, orderliness, cleanliness, proper oiling, and adjusting of machines, discipline and impartial treatment of the help, and remember that it is his duty to look out for the interests of his employers, at all times.

### WARPING.

Warping is another important process in warp preparation, but if good yarn is made in the spinning room and the spooling is properly done, there should be very little trouble in getting good work done on the warpers. A mistake is sometimes made in setting the creels too near the warping frame. This makes it more difficult to tie in broken ends and get them straight, and there are usually more broken ends, because the weak places in the yarn are more apt to break, owing to the strain on the yarn being placed on a shorter length. The creels should be set at an angle that will distribute the tension as nearly equal as possible, no matter what part of the spool the yarn may be unwinding from. Drop wires and the stop-motion must be kept clean and in good order or else the warper will not stop promptly when an end breaks, not only making it more difficult to tie up the end properly, but every revolution of the beam, with an end broken means not only that much waste from all the ends on that beam, but on all the beams in the set, because when the short ends begin to run out on the slasher, the set is cut out. Broken ends should be carefully tied up without being crossed with other ends, and when a new set of spools are put in the creels, the knots should all be run through to the beam before the measuring clock is set.

Care should be exercised in setting the clock so as to get the right number of warps and not make one beam shorter or longer than the others. Another important point is the measuring roll, which should be examined frequently to see that it is well oiled and revolves freely, otherwise the yarn will slip over it and the yarn will be longer than indicated. The speed should not be too high, as this will cause breaks in the yarn and cause the spools to revolve so fast that when the warper is stopped, the take-up roll may not take up all the slack, and the yarn will kink and become tangled. The expansion comb should be adjusted so that there will not be either a high or low place near the heads of the beam, and these heads should be kept tightened up and running true.

On ball warpers, the traverse roll should be kept clean and well oiled, so that the dog will travel freely, and there

should not be too much tension on the ball, or the ends will be apt to bulge out and the threads are liable to get torn or broken.

On chain warpers, the water bands should be properly put on, and care should be exercised in coiling the chains and tieing them up so that they may be uncoiled easily, without becoming tangled, and taking an unnecessary amount of time to run them.

On all warpers, it is important that leases be put in carefully, where required and as required, and this is a point that some warper tenders are apt to get careless about. Every effort should be made, to make each beam, or skein the correct length, and to have each end in place, as this will go far towards insuring the minimum amount of waste, as well as good running work on the slasher and looms.

SLASHING.

If the warps are not properly sized, dried and handled at the slashers, there is sure to be trouble in the weave room, and carelessness or inefficiency in this process, not only will cause considerable loss to the company, but also to the weavers, as they cannot get large production, or good quality product with warps that are not properly prepared.

Slashers should be set on cement floors, where possible, and where they are set on wood floors, there should be a zinc or copper covering over the floor, to protect it from the steam, water, size, etc. This covering should be kept in good repair, otherwise the floor will soon decay, and water will find its way through the floor, and damage anything that may be under it. The stuffing boxes on the cylinders should be properly packed with good packing, so that they will not leak, and at the same time they should not be unnecessarily tight, as this will make the cylinders and rolls run hard. Size should be well cooked and fed to the size-box regularly, so there will be as near as possible a uniform depth in the box at all times.

In making size, all the ingredients should be carefully weighed, and no guess work used about it, as it is very important that each lot should be the same for the same kind of work. In other words, when it has been determined just what is the best size to use on a certain kind of goods, a formula should be adopted and strictly adhered to.

Another point to look out for is the size boiling down and becoming too thin. This will occur at times in spite of all precautions, but if the size is not cooked too long before it is to be used, and the steam is brought to the size kettle without too much opportunity for condensation, this trouble will not be very great. The steam pipe should be well protected all the way from the boiler, so that in cold weather, the steam will not condense heavily before it is turned into the size kettle. When size has become too thin, it is usually better to throw it away, rather than to attempt to thicken it up again, as it is very difficult to get it back to its proper consistency. By frequently feeling of the size between the thumb and finger, and by feeling of the yarn that has been sized, a good slasher tender soon gets to know whether his size is right or wrong.

Squeeze rolls should be well blanketed with good cloth, and as this is expensive, it should be used as economically as possible, but should not be allowed to get too thin, as then the size will not be squeezed out uniformly. The squeeze rolls should be lifted off the immersion rolls whenever the slasher is stopped for more than a very short space of time, otherwise there will be a hard sized place on the yarn, and the rolls are apt to get a flat place on them, causing them to jump when running at full speed.

The cylinders should be washed occasionally, to remove any size or dirt that may adhere to them. Safety valves should be tested frequently to see that they are in good order, and the gauge should be watched to see that there is no more pressure than is allowed. Slasher cylinders will not stand a great deal of pressure, and some very bad accidents have occurred, when for some reason too much steam pressure has been applied to them.

Enough separation rods should be used to separate the ends from each section beam, and the ends should be equally divided in the dents of the comb. Care should be used to build a good warp, that is, the yarn on the loom beam should be uniformly hard and even, so that the warp ends will all have practically the same tension on them when in the loom. When an end is pieced in, it should be placed where it belongs, and not, as sometimes happens, quite some distance from where it belongs.

The section beams, cylinders and rolls should be carefully watched for laps, as the longer a lap runs, the longer there will be an end out in the warp, causing bad work in the weave room. Section beams should be run as near empty as possible to save waste, but should be watched closely when nearly empty, as if many of the ends begin to run out, it is better to cut out the set and make some waste at the slasher, than to spoil cloth.

Cut-markers should be kept in good order, gears and running parts clean and oiled, and the pan well supplied with marking ink, so that a good clear mark will be made. The ink should not be too thick or it will not dry quick enough, and will mark the cylinder, and this in turn will stain the yarn and cause short lengths and seconds. Where leases are put in, they should be put in carefully, otherwise they will be of little value. In pattern work, it is very important to get the correct number of ends of each color or kind in each stripe, particularly where the stripes are narrow. Good work in the spooling room and on the warpers, and well sized warps from the slashers have a great deal to do with maximum production, maximum earnings for the weavers, and profits for the manufacturer.

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Imports of cotton goods to the Canary Islands amount to about $2,000,000 annually. This trade is supplied principally by Great Britain, Spain, and Italy. Several Manchester firms have representatives there, and salesmen from that center call frequently. Belgium sold a considerable quantity of goods, mostly sheetings, and Germany shipped fair quantities of tulles and knitted fabrics. Great Britain, Spain, Italy, Germany and Belgium sell cotton manufactures through the persistent efforts of their merchants, but no attempt, other than the writing of an occasional letter, has ever been made to introduce American goods. Nevertheless, some reach the market, about $30,000 worth of sheetings, denim, sailcloth, etc., being sold direct and perhaps an equal amount coming through European dealers. Cotton blankets are imported in large quantities, because the country people wear them as cloaks.

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Don't be afraid to risk. The great successes are born of chance.

# KNITTING DEPARTMENT.

## A NEW UNION SUIT FOR LADIES.

An improved patented union suit now being put on the market and which is shown in the illustrations, which will undoubtedly find a big demand because of its merits. This garment was patented in Canada, Dec. 8, 1914, and in the United States July 20th, 1915; patent number 1,146,923 by D. C. Collier of Barnesville, Ga., having recently been issued.

J. R. Noodie & Sons Ltd., of Hamilton, Canada, one of the largest and most reputable organizations in Canada, (capitalized at $1,000,000), and controlling several mills, manufacture this union suit in Canada on a royalty basis. They report a big demand for this style of suit.

The Collier Mfg. Co., Inc., of Barnesville, Ga., have been manufacturing this patented garment in large quantities during the past eighteen months, Clift & Goodrich, of New York, Boston, Philadelphia and London selling the production.

This suit is a four-piece garment featuring in its design and make-up perfect covering given to a woman's seat, by reason of the method of uniting the different parts of the fabric. The design is especially attractive to the manufacturer on account of its extremely low manufacturing cost. There is the minimum amount of waste in the cutting of this garment; this is a very strong feature. Another point is the simplicity of the whole suit which reduces the manufacturing cost to the lowest possible point.

including the cutting and finishing operations. Very little hand work is required in the handling of this garment.

In addition to the mills named, it is reported that several of the larger American mills will manufacture this patented suit on a royalty basis the coming season.

D. C. Collier, the inventor of this patented garment, is secretary and treasurer of the Collier Manufacturing Co., having had active charge of the management for the last five years, accepting this position after taking a degree of Textile Engineering with the highest honors at the Georgia School of Technology.

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Don't be afraid to do your best. The best is none too good.

# FUNDAMENTALS OF KNITTING.*

BY JOHN NAAB.

The art of knitting is making a fabric with wires or needles, using a single or more parallel threads for the entire fabric. It is the youngest of all important textile manufactures and is quite modern when compared with others.

The operation of machine knitting is accomplished by specially made needles, of which there are two kinds principally employed, namely, the spring beard needle and the latch needle. Figure 1 will give an idea of the construction of each.

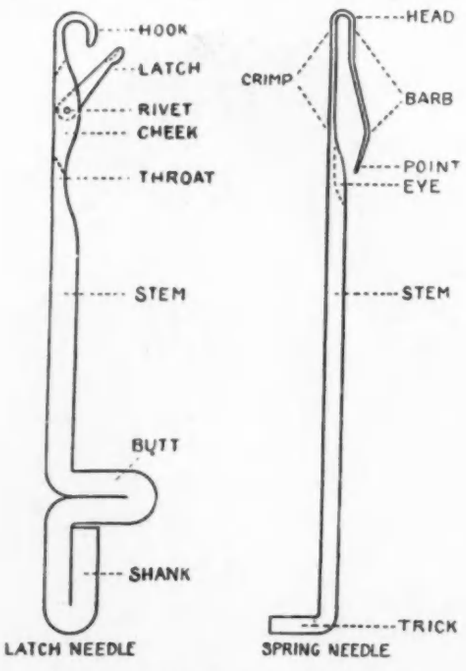



FIG. 1. A COMPARISON OF NEEDLES.

The spring beard needle is the older form, and up to the present time it is possible to form a smaller stitch or loop on this style of needle on account of its construction. This is best explained by following the various stages in forming a loop on the bearded needle in the diagram shown at Fig. 2.

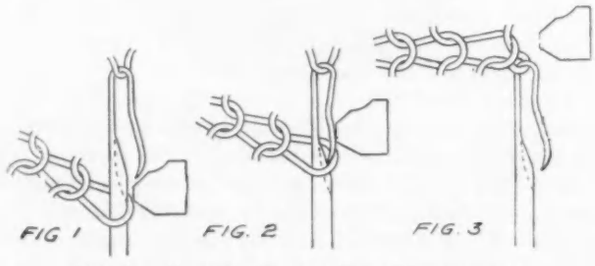



FIG. 2. SPRING NEEDLE LOOP FORMATION.

It will be noticed that when the barb is pressed it lowers the point into the eye and leaves the outer surface the thickness of the stem. On account of this small loop it is used for the fine grades of knitted fabrics.

*Presented at the Fourteenth Annual Meeting of the Alumni Association of the Philadelphia Textile School. All rights reserved.

An improvement which was of great importance to the knitting trade was the invention of the "latch" or "tumbler" needle by Mr. Townsend in 1847. The advantage of this needle is that it enables the fabric to be made more easily, but it is not an improvement in regard to the quality of the fabric. In machines in which latch needles are used, the needles themselves move in grooves or tricks, each being carried forward in succession as the yarn feed comes opposite its position. The principle of making a loop on the latch needle can be traced by the illustration of the four figures in diagram Fig. 3. In this diagram Fig. 1 shows a needle starting to raise, with the loop opening the latch. Fig. 2 shows a needle receiving yarn at its highest point, with the loop in the throat of the stem; as the needle lowers this loop passes beneath the latch, closing it, as in Fig. 3. Fig. 4 shows the needle in regular position with a new loop or stitch formed.

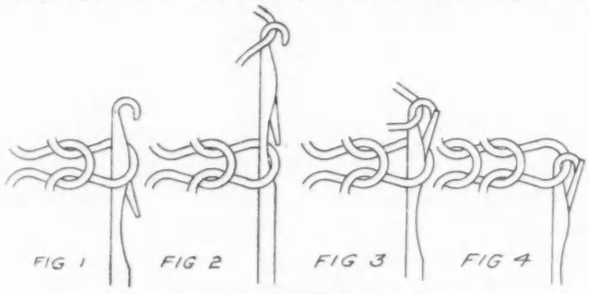



FIG. 3. LATCH NEEDLE STITCH FORMATION.

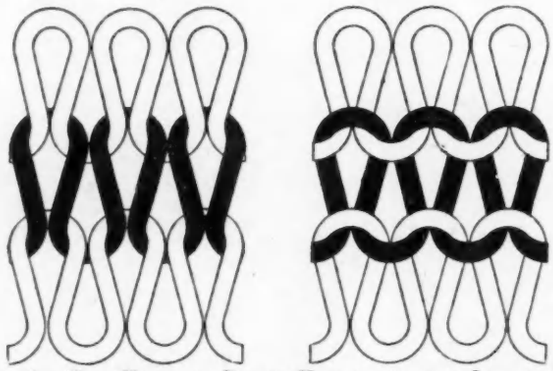


FIG. 4. THE FACE OF PLAIN FABRIC ON THE LEFT; THE BACK OF THE SAME FABRIC ON THE RIGHT.

In the formation of cloth there are three foundation weaves from which, by combination, practically all patterns are made. In knitting there are two foundation stitches from which, by combination, all kinds of knitted fabrics are made. They are as follows: First, plain stitch; second, rib stitch.

The plain stitch is the simplest form known and is made with one set of needles. It is used in the production of hosiery and underwear, or any knitted fabric where a smooth surface is desired. It is distinguished by the line of loops running lengthwise on the face, while on the back they show the reverse. By examining the illustration of the face and back of the plain stitch in Fig. 4 it may be more clearly understood.

If we examine the build of the knitted fabric analytically we may find what is required to make an ideal knitted fabric. As the foundation of a knitted fabric is the loop, we will take it as a starting point and consider what kind of loop is necessary to make a good knitted fabric. The loop can be made to form an elongated shape, that is, cover more

space in length than in width, or it may be exactly opposite, but the point to be aimed for is a loop symmetrical in form, that is, it should cover the same space in both directions, and when this fundamental point is fulfilled we see the dependable nature and manner in which one loop is connected to the one on either side, and also to the loop above and below it. This tends to form a fabric which is nicely balanced and full of elasticity and yield. This elasticity is due to the bending of the yarn in several different directions, and the kind and quality of yarn used, bearing in mind that knitting yarns are soft and pliable and also are not to be drawn as tightly as in woven cloth.

The rib stitch, the other foundation stitch, is made on two sets of needles which knit at right angles to each other. It is not as easily unraveled as the plain stitch and can only be unraveled from the end which was knitted last. It is employed in fabrics where a great amount of stretch or

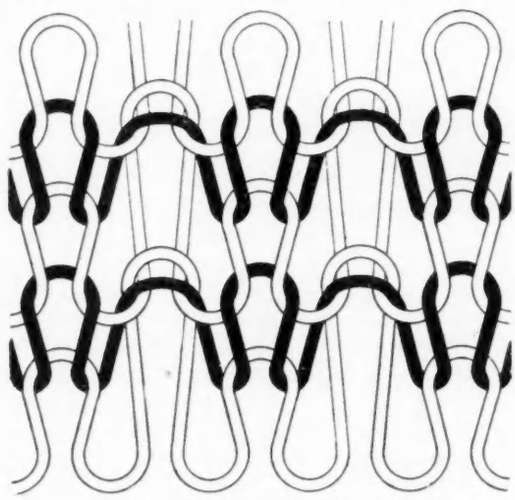


FIG. 6. AN EXAMPLE OF TUCK STITCH.

elasticity is required, such as tops for half-hose, wrist or ankle cuffs, etc. A fabric of this character may be distinguished by the fact that each side presents a similar appearance, each side containing rib lines, with a small space between each rib, the rib line on one side coming opposite the spaces on the other. There are numerous forms of rib stitches.

The tuck stitch, which is the third in importance, may be constructed on both the plain and rib stitch, and is produced by allowing two or more loops to remain on the needles before casting off. Fig. 6 shows a tuck stitch formed on the rib stitch and using only one set of needles. This form of stitch is used extensively on the end of knitted fabrics to prevent unraveling.

The best known and most useful type of machine upon which these various stitches can be made is termed the flat knitting machine. It can be used for a wide range of different products, all of which can be obtained with but a slight alteration of adjustment.

The circular knitting machine of the present time, by which tubular work can be produced without seams, was invented about 1840. The remarkable development of these machines from 1840 to the present time has been very rapid, on account of its production and cheapness of manufacture. As the seaming sewing machines have also advanced, it is now possible to knit fabrics on broad diameter machines, cut out the garments and seam them together, to compete with woven cloth. It might be of some interest to those who are strangers to the process of machine knitting to know that it was once a great feat to knit from 100 to 1,500 loops per minute, while the modern machine of the latest type makes as high as 500,000 per minute, of the finest quality and with safety. It has been the custom to classify these machines according to the fabrics they produce, and for that reason we have the following, which are the main machines: First, rib top; second, stocking machine; third, body frames.

These machines are automatic in all their movements and changes, which include all the different positions of the needle. Summarized, in spite of the manifold variations of stitches, only four fundamental positions of the needles are required, namely:

1. Clearing position.
2. Tucking position.
3. Welting position.
4. Knitting position.

These positions are all decided by the pattern mechanism which controls the various cams which, in turn, actuate the needles.

The builders and users of circular knitting machines have a choice of either a stationary or revolving needle cylinder. The stationary needle cylinder has been popular on account of the various changes being made direct, so that the work

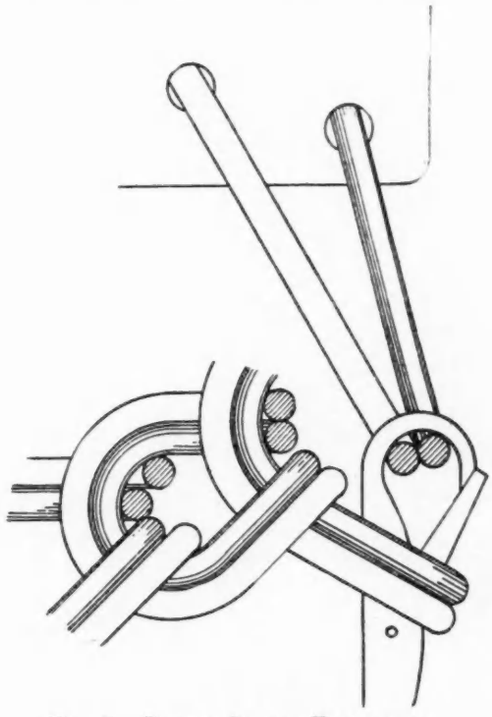


FIG. 7. PLATED STITCH FORMATION.

can be cut off without the loss of time. The revolving needle cylinder is becoming a favorite on account of its speed. As both styles of machines are widely used, it is a matter of opinion which is superior, as the mechanical construction is the only thing that differs, while the cams which control the systems of the loops and action of the needles are practically the same on both styles.

Another point of interest is the method of drawing the fabric after it is completed. This take-up consists of a pair of fluted rollers which swing on a pivot, balanced by the fabric. As the fabric is produced the weight of the rollers

draws the fabric down until it reaches its lowest position. At the lowest point it comes into contact with a rope drive, which revolves the fluted rolls until they again reach their highest point. The take-up is negative and can be increased or decreased by adding or removing weight.

Knitted fabrics may be "plated," and are knitted with two kinds of yarn, the inferior quality being knitted on the back. This is accomplished by keeping the yarn apart until it reaches the needle; also, the yarns are kept at different tensions. The thread nearest the point is hidden in the fabric.

# Dyeing, Bleaching and Finishing.

## THE NATURAL AND MINERAL COLORING MATTERS.

BY WILLIAM B. NANSON, F. C. S.

Owing to the present scarcity of aniline dyes it may not be amiss to call attention to, and renew our acquaintance with, the old-style dyes and colors as worked by our fathers—and very good work our fathers and forefathers did with them too—witness the mummy clothes found in the tombs of Egypt, and the mural decorations in the recently excavated houses of Pompeii and Herculaneum, whose colors are as bright and clear today as they were when they were applied to the linen bandages of Rameses or the walls of Pompeii, in the days when the children of Israel beat their way out of the land of Egypt and out of the house of bondage, or when Glaucus the Athenian fought his last fight in the arena at Pompeii many hundred years ago.

Witness, also, the far-famed rugs of Bokhara and the East, which have maintained their colors throughout the countless years and where there is today the severest laws against the use of aniline colors and their sale is prohibited under heavy penalties. The colors on a Bakhara rug will last throughout all time, and no dyestuff of sixteen syllables is used on them either.

The main, and in fact almost the only advantages that most of the direct aniline colors possess, are that they are easily handled, and being easily handled and requiring no special skill in their use, any kind of a proposition can hold down a job as a boss dyer; and further, since the potent voice of the efficiency expert has been heard in the land, these are the grand desideratii to financial and pronounced success.

Aniline dyes are, most of them, of a more or less substantive character; they simply impart their own color to the fibers they are brought into contact with. There are, of course, some exceptions to this, the alizarines for instance, and a few others. These substantive colors are monogenetic and even where mordants have been employed to fix them, they are only capable of yielding one color, no matter what the mordant may be.

The adjective dyes about which we are writing, an the other hand are polygenetic, *i. e.*, they are capable of forming totally different colors according to the mordant employed, and will only dye materials that have been mordanted with a metallic salt or hydroxide, or, with the addition of a metallic salt or hydroxide to—or subsequent to—the actual dye bath; such are logwood, quercitron bark, cutch and the mineral colors—chrome, iron, manganese, etc. These latter in conjunction with various other minerals and hydroxides form the colors, chrome yellow, chrome orange, khaki, and various shades of tans and browns, all of which are distinguished by their fastness.

In the pure state the adjective dyes are in themselves only slightly colored, but when used in conjunction with metallic mordants they become intensely colored, insoluble compounds, which are formed in and become a part of the substance of the fiber, which thus becomes dyed.

Artificial coloring matter—anilines—are products which are usually chemically pure and can always be obtained of the same quality and composition, hence the ease with which they can be applied.

The natural coloring matters, however, usually contain their active principles or constituents in very small and varying quantities and special and varied treatment is, in most cases, required for their extraction and application.

The cotton fiber having little or no affinity for the coloring matter of the dyestuff, compels us to resort to the use of mordants for its fixation. A mordant is a sort of intermediary or go between which acts as a mutual attraction for the fiber and the coloring matter. It must have the property of forming within the fiber insoluble combinations having a strong affinity for both the fiber and the coloring matter, so that by combining the substance used as a mordant with the fiber and then passing it into the dyeing solution, the color is produced and indelibly fixed in and upon the fiber by the combination of the two.

The principal mordants are the various tannin matters, the oxides and salts of the metals, and the fatty acids. Cotton possesses a remarkable power of attracting tannins from their aqueous solution. However, cotton does not extract tannin from its solution at a temperature above 140 degrees Fahrenheit and must be used cooler than that temperature to become efficacious. It is quite true that hot solutions are generally used in the dyehouse, but this is only to saturate the material quicker with the liquor and to drive out the air entangled in the fabric; the cotton is then allowed to lie overnight in the liquor and it is while it is cooling that the greatest amount of the tannin is extracted and combined with the fiber. Time is a great factor in the mordanting of cotton with tannin, it has been found to be still absorbing tannin after 12 hours immersion.

I would also say that the tannins only form precipitates with the acetates of the heavy metals. With the sulphates, chlorides, and nitrates, no precipitates are obtained since the tannates do not form in the presence of free mineral acids and their application in dyeing is based upon the fact that they are readily and permanently absorbed by the fabric, and have the property of forming insoluble compounds in the fibers; on the one with the oxides of the heavy metals, and on the other hand with the coloring matter of the dyestuff.

The two principal tannin matters used in the dyeing of the natural colors are sumac and cutch; the former gives a blue black coloring and the latter a green olive with the persalts of iron. The former may be used for the produc-

tion of a very fast black and a large variety of slate and gray colors, and the latter is capable, in conjunction with various metallic salts, and also with other natural dyestuffs, of producing a vast range of colors from light tans and chamois colors through different shades of browns, modes, sages, olives, etc., all possessing great permanence to the action of light and fastness to washing. Moreover, all these colors are singularly immune from the attacks of mildew and the effects of being in damp places, hence, it is indicated that they are the proper colors to use for sail cloths, canvas for hay caps, tarpaulins, horsecovers, or any cotton fabric exposed to damp or weather, and this is where the old-style of dyeing, as practiced by our fathers comes into its own again, with all its elaborate system of mordanting, ageing, and dyeing, involving as it does the combination and precipitation of insoluble and inert lakes on and in the very heart of the fiber.

Of all the tannin matters used in dyeing as a mordant for the fixation of the coloring matters of the natural dyestuffs, sumac stands preeminent. The tannin in sumac is found in the shape of gallo-tannic acid; it is sold as a liquid extract standing at about 53 degrees Tw., and is readily soluble in hot water. This aqueous solution gradually decomposes, on standing, by fermentation and must always be used fresh. The tannin in sumac is readily oxidisable and reduces the salts of the nobler metals, iron, tin, etc. Ferrous salts give a grey-brown coloration, gradually turning bluer. Ferric salts give a blue-black coloration, gradually turning browner. Hence we see the necessity of a mixture of the two when dyeing black with sumac and logwood, to produce an even jet black which will not fade.

The very finest logwood blacks that are absolutely fast to all ordinary wear and tear, are dyed upon a mordant of tannate of iron and the procedure is as follows:

Boil up 35 pounds of sumac extract at 53 degrees Tw. in 50 gallons of water, wet the goods out in this, boiling, and let them lay all night to age and cool. In the morning pass the goods through cold lime water, using one pailful of slacked lime, made into a paste, to 50 gallons of water. This forms an insoluble tannate of lime on the fiber. The goods should turn green at first and gradually grow browner. Do not wait for them to turn brown, but when they are at their greenest point—and this is important—run them through a mixture in solution of half each of copperas (or black iron) and neutral nitrate of iron standing at about 4 degrees Tw. This liquor must also be used cold. Wash well from this. The tannate of iron thus formed imparts a dark grey color of great permanence and fastness. The goods are now taken to a standing bath made from 30 pounds of logwood extract at 51 degrees, and 5 pounds quercitron bark extract to each 50 gallons of water to start; after this, half or less of this amount added to each lot will answer; wash well from this and it is finished. If the goods look overdyed or rusty, a little soap in the rinsing will make them right; but do not chrome or copperas the goods after the logwood on any account; chrome will turn the goods brown in the finishing or ultimately in the cases, and copperas will make them hard.

Very good blue-blacks may be dyed on cotton by taking advantage of the well known action of carbonate of copper in contact with cellulose. The bath may be commenced with 30 pounds of logwood extract at 51 degrees, 5 pounds of sulphate of copper, and 5 pounds of soda ash; boil up well about one hour, or if for piece goods run twice through and allow to stand overnight. It is better not to wash this black at all. If dyed on raw stock it may card easier if washed, but washing injures the depth of the color and it should not be washed. The writer has carded all he ever handled without washing. If glaubersalt is added to the bath it will card easier, *but don't wash this black.* I have given the starting quantities; for subsequent lots the quantities may be cut down one-third, or more, according to the quality of the stock and the judgement of the dyer.

Beautiful shades of drabs and modes of great fastness to light and washing, can be dyed by mixtures of sumac with other dyewoods. A stock solution is made of 35 pounds of cutch, 20 pounds of sumac, 1½ pounds of blue vitriol, and 50 gallons of water. Boil the cutch first in part of the water until dissolved, then add the blue vitriol until dissolved, then add the sumac. Add 10 gallons of this mixture to 50 gallons of water and run the goods through cold.

Make a second stock tub containing 20 pounds bichromate of soda and 50 gallons of water. Add 10 gallons of this liquor to a fresh bath of 50 gallons of water, use this hot and run the goods through it; wash.

Make a third stock tub containing 30 pounds of copperas, 30 pounds of nitrate of iron, 20 pounds of alum, 1 gill of oil of vitriol and 50 gallons of water. Add 10 gallons of this liquor to 50 gallons of water, raise the goods in this cold and wash.

For all subsequent lots the quantities added to these baths may be reduced 25 to 50 per cent. A very large variety in the depth of shades may be obtained by varying the quantities used in the dye bath and also a great variation of the color by varying the preparations of the dyestuffs in the stock tubs. For instance, increasing the cutch will make the goods browner, and increasing the sumac will make the goods bluer. Sumac may be used alone for a large variety of shades, which are much more permanent than the corresponding shades dyed with logwood. All these colors are best dyed in the cold. The receipt first given dyes a beautiful medium shade of mode.

Cutch or catechu is perhaps the most valuable to the dyer of all the tannin substances which give a green coloration with persalt of iron. It was extensively used for dyeing cotton goods, owing to the great variety of drab and brown shades which it yields with various mordants and their great fastness; greenish or gray drab shades are produced with aluminous mordants alone; yellow drabs, light yellows, or chamois tints, with chloride of tin; and various shades of browns, with the iron mordants, which may be fixed and intensified by passing the goods through a weak bath of bichromate of potash or soda and all of which possess the merit of being mildew proof.

When cutch is dissolved in boiling water it has a gummy consistency which hinders its application and penetrating power and the addition of a salt of copper has been found necessary to destroy this gummy principle so that one of the copper salts, usually blue vitriol, must be added to the solution previous to dyeing the goods with it.

The chemical change which takes place in the addition of copper salts to a solution of cutch is not well understood. The explanation generally given is that the salt oxidizes the cutch, producing an insoluble oxide, which is, in turn, soluble in a solution of cutch not oxidized. The writer thinks that the action is not chemical at all, but catalytic, in which the added salt takes the part of a catalyst. There is, however, no doubt that the addition of a metallic salt

to the solution facilitates the oxidation of the cutch upon the goods.

When dyeing cutch browns with cutch and chrome it is advisable to make stock tubs as follows: Cutch tub, 450 pounds of cutch and 400 gallons of water. Boil well until dissolved and then add 90 pounds of blue vitriol. Boil together until all is dissolved and allow to settle overnight. Chrome tub, 200 pounds bichromate of potash and 400 gallons of water. Iron tub, 30 pounds of copperas, 30 pounds of nitrate of iron, 1 pint of acetic acid and 50 gallons of water. In dyeing with cutch a thorough penetration of the dye is always desirable and the process should be somewhat as follows:

First wet the goods out in a solution of "bottoms" at a boil and allow them to lie in this all night. When cutch is dissolved in a stock tub, and allowed to settle, a thick sludge of a brown amorphous matter caused by the oxidation of the catechin during the original evaporation of the decoctions of the plants, together with a large quantity of unoxidized catechin which crystallizes out of the solution as it cools, will settle to the bottom of the stock tub. This sediment should be run into a separator tank and boiled up with 400 gallons of water. This constitutes the liquor known as "bottoms."

After steeping in the bottoms overnight, the goods (*i. e.*, yarns, raw stock, or piece goods), must be run in a solution of cold cutch made from the stock tub, reduced to 4 degrees Tw., and allowed to lie overnight. The next day the goods are run again in cutch at 4 degrees Tw. cold, and then chromed hot with 10 gallons of chrome from stock tub already described to 50 gallons of water and washed. The result is a deep red-brown, rather undesirable in itself, but it forms the basis for a number of very desirable dark shades. It may be said here that the cutch dye bath standing at 4 degrees Tw. must be kept as a standing bath and freshened up from the stock tub so as to keep it standing at 4 degrees Tw. If the goods are run through 10 gallons of the iron liquor in 50 gallons of water described before chroming and washed and then chromed, a dark seal brown is the result. If they are run through the iron liquor after chroming a yellower dark brown is the result, and so on *ad infinitum*, a vast varety of shades of brown can be produced by using different strengths, different proportions of the various ingredients, and a little brains coupled with a wide experience.

Very pretty and fast tans, khaki, and mode shades can be dyed with cutch combined with the other dye-woods. I have already described some of these under the head of sumac. Make a stock tub as follows: 60 pounds of cutch, 30 pounds of quercitron bark, 16 pounds of bluestone, and 50 gallons of water. This mixture used half strength and chromed with 10 gallons of chrome liquor in 50 gallons of water gives a beautiful dark tan; if iron liquor be applied after chroming a fine greenish mode will be the result. More bark to the stock tub will produce a sage, less bark a reddish mode, etc. If we use only 10 gallons of the liquor from the cutch tub instead of half strength and reduce the chrome and iron proportionately we get some fine mode and drab colors of great fastness.

*Khaki*, if properly dyed, is one of the fastest colors known. A similar shade may be dyed by using the sulphur dyestuffs, or the Alizarine dyestuffs with a chromium mordant, or by the combination of some of the new vat colors, but none of these can altogether replace the real thing dyed with the mineral colors by fixing on the fibers a mixture of the chromic and ferric hydrates. The only objection to the mineral hydrates are that they make the finished goods harsh to the touch and they cut and sew badly, but these objectionable features can be largely overcome by preparing the goods in Turkey red oil. In dyeing khaki, therefore, proceed as follows:

Run the goods in a solution of Turkey red oil using four ounces of oil to the gallon of water. Run boiling hot and then dry the goods. Run the goods through a cold solution of acetate of chrome and acetate of iron at 24 degrees Tw. and let lie overnight; the next day run again in the chrome and iron. The cloth must now be thoroughly dried on wrapped tins so that the cloth does not touch the bare metal until nearly dry. Then steam and age on a continuous ager, the steam and air in the machine being kept at 220 degrees Fahrenheit. The goods are then passed through a boiling solution of caustic and carbonate of soda, standing at about 8 degrees Tw., using about 12 pounds of caustic to 4 pounds of carbonate. The goods must now be soaped and they are finished. If the shade be not green enough, or too green, the goods may be slightly tinted in the soaping bath to shade, using any fast blueing or yellowing matter.

Dye goods for *Prussian blue* first a full iron buff which is one of the fastest and most useful colors known, and the attention of the gingham and shirting designers is herewith called to it. The goods are impregnated with a solution of nitrate of iron standing at 6 degrees Tw.; squeeze and pass at once through a solution of caustic and carbonate of soda or soda ash at 3 degrees Tw.; this latter must be kept boiling; wash well. For Prussian blue, the goods are now run through a solution of yellow prussiate of potash, using 40 pounds of prussiate and 20 pounds of oil of vitriol to 50 gallons of water; this is for a stock liquor. This is used cold and enough of it entered into the dyebath from time to time as needed to raise the blue. This gives a clear, bright blue, fast to light and acids, but is discharged by strong caustic lyes. To make it faster to these latter influences and to make it darker so as to imitate a rich indigo shade, proceed as follows:

Dissolve 300 pounds of alum in 300 gallons of boiling water; when thoroughly dissolved add 150 pounds of logwood extract at 51 degrees, let this stand a few days or until cold. This is called a plum tub and the liquor is plum liquor. Prussian blue goods as dyed above must be thoroughly dried, then padded in this plum liquor at various strengths, according to the shade desired; the logwood in the liquor will combine with the iron constituent in the blue and form a fast indigo blue color on the goods, the depth of which will depend on the strength of the plum liquor used. For all cotton fabrics where a good dark indigo blue is required, without having to withstand continuous periodical washing, this blue is all right. It is well adapted to dark cotton dressgoods, linings, cottonades, tickings, etc. It would not, of course, take the place of indigo in denims, or the vat colors in wash fabrics, but it is a good fast useful blue.

Returning again to the subject of khaki, I should have said when writing on that subject that acetate of chrome can be made in the dyehouse by dissolving equal weights of chrome alum and acetate of lime together; a little soda added will facilitate precipitation; allow this to settle and use the clear liquor.

I should have also said that a variety of shades of khaki can be dyed without the use of acetate of chrome,

by first mordanting the goods with sumac, fixing with nitrate of iron, and then chroming with bichromate of soda. The latter destroys the tannic acid and a mixture of iron and chromium oxides are left on the fiber. Some good fast shades of this character can be dyed in this way by various mixtures of sumac and bark.

*Chrome yellow*, to look at its best, should be dyed upon a bleached fabric. The color can be made to vary from a light lemon yellow to a full orange yellow, and it is distinguished by its almost absolute fastness to light, soap and acids. It is turned orange by alkalies; the original color returns, however, if the alkali is neutralized by an acid. The fumes of sulphurated hydrogen turn the color brownish.

There are two ways of producing chrome yellow—by impregnating the goods with a basic salt of lead, and by using the lead salt in the form of a plumbite. We shall use the basic method, because, if we wish to convert the yellow into orange, the basic method is the best for this purpose, as we get more lead oxide on the fibre. To prepare the stock liquor of the lead solution, dissolve boiling 100 pounds of acetate of lead and 50 pounds of litharge in 50 gallons of water and allow to settle; the liquor should stand about 40 degrees Tw.

To dye the yarn or goods, they are first run in an epsom salt solution standing at 6 degrees Tw., and dried up. Then work in a solution of basic lead salt prepared by diluting stock liquor with cold water to 10 degrees Tw.; squeeze and pass through a solution of glauber salt at 4 degrees Tw. The lead bath is used continuously and kept at the same strength by the addition of fresh stock liquor. After the glauber salt, the goods are chromed with 3 pounds bichromate of soda to 50 gallons of water, cold. This bath may also be maintained as a standing bath by the addition of fresh chrome. It is best, also, to add a little acid to this bath from time to time to cause the action of the chrome to be more energetic.

The depth of the shade ultimately obtained is dependent entirely upon the strength of the lead solution, and on the quantity of lead oxide deposited on the fiber. The goods are very heavily weighted with chrome yellow and orange, so much so that in many cases the extra weight pays for the dyeing.

*Chrome orange* is produced by dyeing the yellow as shown and then raising the orange by passing the goods through boiling lime water. This is a very particular operation. If the lime is not kept at a brisk boil the color will be stripped instead of being raised; care must also be taken to wash the goods immediately, for if they lie in the lime they will be spotted and uneven. In the case of warps or piece goods, the goods should be limed in a two box machine so that they can be raised in boiling lime in the first box and entered immediately into a cold rinse water in the second box.

Of the other mineral colors *manganese brown* is the only one that is worthy of notice and this color is so difficult to dye that its application will not be studied in this paper. Of the other natural dyestuffs, indigo is as scarce as the anilines; quercitron bark is used for yellows in conjunction with tin and alumina mordants, and olives with iron mordants, all of which are more or less fugitive; but it is a valuable constituent of many colors when mixed with logwood, cutch and the other dyewoods. Fustic has no place in a cotton dyehouse. Tumeric and the red woods are too fugitive though they may be usd to some advantage to twist or modify some of the faster colors. Quebracho, hemlock and chestnut bark extracts may be used extensively where a cheap tannin bottom is required in conjunction with iron mordants, though colors dyed with these tannin matters are apt to look rusty.

## THE BEHAVIOR OF DYED SHADES IN GAS LIGHT.

BY DAVID PATERSON, F. R. S. E., F. C. S.

It is common knowledge with every dyer, especially of wool and silk, that there are some dyed shades which change greatly in appearance when examined in the ordinary artificial lights. All shades change more or less, according to the impurity of the light which illumines them, but some change so much and in such an unexpected manner that they become a constant source of difficulty and anxiety to the dyer. It is possible, for example, to dye a shade of olive to match perfectly in daylight another shade of olive. The two may appear identical; and yet, when both are examined in gas, or lamp light, one may go off with a reddish terra cotta shade, while the other becomes more of a green olive; thus appearing totally dissimilar. Many of these supersensitive dyed shades change in gas light in a manner totally unexpected. For example, it is possible for

Buffs to appear light pinks
Moss greens to appear dull plum shades.
Light violets to appear pinks
Olives to appear russets
Browns to appear Moss greens
Greys to appear sage greens.
Slate blues to appear greys
Citrines to appear terra cottas
Smoke drabs to appear red browns.

The cause of such perplexing color changes lies in the different optical structures of the colors, or, in what is termed their absorption spectrum. One shade is built up differently from the other, and the artificial light, with its excess of red and orange rays, reveals the difference.

Although the human eye can distinguish the nicest difference in the outward appearance of colors, it cannot analyze the color into its component parts, or, in other words, see how the color has been optically built up. This is the work of the prism, or spectroscope, and it is here that this instrument comes in useful to the colorist.

### WHITE LIGHT.

Let us take a simple example before proceeding to the more complex combinations to be found in these sensitive dyed shades. Every reader knows that ordinary white light is a delicately balanced mixture of all the colors of the rainbow, *i. e.*, red, orange, yellow, green, blue and violet. If this delicate balance be in any way disturbed, we get not white light but colored light. If the yellow and green rays are abstracted, we get a beautiful eosine pink. If the green, blue and violet are abstracted we get an orange color, while the absence of red, orange and yellow produces a beautiful blue.

All the infinite variety of hues to be found in nature and art owe their existence to those colors already present in the sunlight.

But a white light can be produced by combining blue light with yellow light, and this white light is indistinguishable to the eye, from the much more complex white light of the sun. Suppose, for a moment, that ordinary day-

light was composed in this way of simply blue and yellow rays, the only colors we could see in nature would be tones of yellow and blue, black and white and greys. There would be no rich warm hues of red or orange; no soothing greens or violets. It would be a far less beautiful world to live in. But, though the eye could not distinguish any difference in the white light, the spectroscope would at once reveal the two colors, yellow and blue; in the same way that it first revealed to Sir Isaac Newton the wonderfully complex nature of sunlight, in his classic experiment of 1665.

When the delicate color perceiving nerves in the retina of the eye are stimulated by two or more color impressions, we see only the combined result. An interesting case in point is the sensation of seeing yellow. Yellow is a primary color to the dyer and the painter because, no admixture of dyes or paints can make a yellow color. But, if it be examined through the spectroscope, it is found to be a combination of red and green rays of light. These two colored rays combining within the eye produce the sensation of seeing a yellow color. The reason why we cannot produce a yellow by admixture of red and green dyes or pigments is because there are no dyes sufficiently pure to produce the effect of the pure colored lights. The nearest approach we can get to a yellow by combination of paints or dyes is to paint them in sections upon a disc, which, if rapidly revolved before the eyes, mixes the red and the green optically on the retina, and gives the rotating disc the appearance of being painted with a dull yellow or yellow-orange color. If we mix these colors in the dye bath, or on the palette, we get only a dirty grey, or even a black.

TWO SIMILAR BLUES.

Let us now consider a more complex case, approaching closely to that of dyed shades on wool or silk. Take two tumblers or glass beakers half full of water, and into the one add a few drops of methyl violet solution and thereafter a few drops of malachine or china green, until a rich azure blue is produced. Into number two vessel add a few drops of Prussian blue solution (made by adding ferrocyanide of potassium to a dilute solution of iron nitrate) until the depth of color exactly matches that of number one. Here, then, we have two blue solutions, which, when held up to the light and compared appear to be identical colors. But examine them through a piece of orange tinted glass or gelatine film and a difference will be at once detected. While number one blue looks quite a purple or even a ruby red color, the other is a greenish grey in appearance, quite different from the first. The reason for this change in appearance between two apparently similar blues is the fact that they are optically different. They are constructed of different parts of the spectrum. Blue number one is composed of red, green, blue and violet rays, as shown by the spectroscope, and these produce the sensation of an azure blue; while blue number two is found to consist of a little green and blue alone, with perhaps a little blue violet. It contains very little red. Hence the difference in behavior when viewed through an orange filter screen or tinted medium. A similar result, but in a much less degree, would be observed in examining these two blues in gas or lamp light. The excess of red rays in the artificial light would make number one blue appear redder, while number two would keep its blue tone, because of the smaller amount of red in its composition. It would, however, appear darker owing to the deficiency of blue rays in gas or lamp lights.

All colors which readily transmit red rays are sure to become redder when viewed in gas light. As a rule, all the natural dyestuffs like fustic yellow, flavine, logwood, indigo, barwood, Persian berries, madder, cochineal and archil readily transmit the red rays, and this tends to make all colors dyed with vegetable dyestuffs change uniformly (*viz.* redder) in artificial lights. This uniformity of change helps to preserve the harmony of Eastern rugs and carpets when viewed in gas or lamp lights.

VEGETABLE VERSUS ANILINE DYES.

When the natural dyes are examined through the spectroscope along with some of the aniline colors, the observer is at once struck with the difference of their absorption spectra. While the absorption bands are gradually shaded off in the natural dyes; with the anilines they are often sharp, decisive and characteristic. This makes the latter class of colors more sensitive to different qualities of illumination. Any variation in the nature of the light is apt to alter their appearance. It is possible for example to have two carpets or rugs apparently identical to each other. One may be a genuine Eastern textile, while the other is a Western match to the original. In daylight they may pass for the same thing. Examine them in gas light and the Eastern texture still preserves its rich harmony and beauty of color, while the Western, dyed with aniline dyes, may show an altered and not so harmonious scheme of coloring. Of course a genuine Eastern carpet is dyed with the natural dyestuffs. But it is quite possible for the dyer, if he is careful and well skilled in his business, to initiate with anilines, the exact behavior of the vegetable dyes under gas light. In order to do this thoroughly, he must examine his shades in gas light, or through an orange tinted gelatine film, and see how they behave.

An interesting case once came before the writer's notice. A carpet with a beautiful chaste design of brown autumn leaves scattered over a rich dark brown background was faithfully copied by the dyer and the effect by daylight was quite successful. The whole scheme of coloring was harmonious, and suggestive of autumn; but when the carpet was viewed in gas, or candle light, the brown leaves had become varying shades of olive green, more like a spring effect than autumn. If the dyer, in this instance, had viewed his proposed shades first under gas light, this trouble could have been avoided.

Certain blues, of the clear greenish-blue type, had been used in dying the brown shades, and such blues, which show a marked absorption of the red and orange rays in their spectrum, change readily in gas light and become much greener. Still this effect is not so bad as another instance where a leopard's skin was the object copied. The daylight appearance of this leopard's skin rug was an excellent copy of the genuine article; but unfortunately, in artificial light, the rich tawny coloring of the skin changed to an olive green, a feat more associated with the chameleon than the leopard. The reason for this was the same as the previous instance just quoted. Had the brown shade been dyed with a less sensitive combination of dyes, and the greenish blues like patent blue, wool green, or cyanine blue, been avoided, a better result would have been obtained.

OPTICAL CHARACTERISTICS.

In dyeing compound shades it is not an easy matter to conceal or mask any decided optical property possessed by one of the dye constituents. If one dyestuff has the property of turning much redder or greener in gas light, that

peculiarity is observed in all the compound shades into which that dyestuff enters. For example, if methyl violet is used for "saddening" drabs, olives or browns, those colors will all tend to redden much in gas light because the methyl violet itself has that property strongly developed. But suppose, instead of violet, a clear greenish blue is used like wool green or turquoise blue, the opposite effect is produced and all compound shades containing them become much greener in gas light. The presence of any of these dyes is difficult to hide, and although mixed up with other dyes in compound shades they reveal themselves upon the first opportunity. However, with due care and knowledge of their properties, one dye may be used to counteract the other so that a perfectly normal gas light appearance can be obtained.

The whole subject is one of deep interest and importance to every dyer and well repays any time spent in its study.

## SUBSTITUTING THE ARTIFICIAL DYESTUFFS ON COTTON.

BY A. F. MUSGRAVE.

The cotton industry is especially inconvenienced by the present shortage of artificial colors. It is the cotton industry which will suffer the most for the reason that the natural dyestuffs are much more easily applied to wool than to cotton. Practically all of the cotton which has been dyed of late years, has been dyed with the coal tar dyes of one of the following classes. Direct, basic, sulphur or vat. It is now up to the dyer and color chemist to replace these four classes as far as possible with the natural dyes and to obtain the same shades and fastness as heretofore.

There are only a few of the natural colors which are of any interest to the cotton dyer. Of course, practically any color of any class may be dyed upon the cotton fiber, but when the color requires a mordant it is rather difficult to apply it to cotton. The natural dyes which are of interest to the cotton dyer at the present time are, indigo, logwood, fustic, cutch, turmeric, quercitron bark, hypernic and madder. This is a very short list of products with which to replace the many thousands of coal tar dyes which have been put upon the market in the past twenty or thirty years. It will of course be impossible to totally replace all of the coal tar products and to produce the bright shades for which these artificial dyes are noted. In general all of the natural dyestuffs yield dull tones and it is only these dark or dull shades which may be successfully substituted.

The question of black is a very serious one at present. Even in quarters where there is a sufficient amount of black suited to the hosiery trade, such as developed black, there is generally a shortage of the required developer to produce a good black. Sulphur blacks as well as direct blacks are at present in the market in very small quantities, although it is stated that one American manufacturer of dyestuffs has contracts calling for 60 per cent of the normal consumption of direct black. It is, however, a comparatively simple matter in a great majority of cases to turn straight from direct black to logwood.

Logwood, which is the only natural dyestuff which will produce a black on cotton, may be applied in several ways. These different methods are of use in special cases, such as the coloring of raw stock, and another method for the dyeing of yarns and pieces. Logwood extracts vary a great deal in their money value, not on account of adulteration, but owing to the degree of oxidation to which the logwood has been subjected. The only method of testing logwood or hermatine is in the dyeing of trial pieces in a comparative manner.

The principal methods which are used for the application of logwood to cotton are called, the one bath method, the one bath-saddened, and over a mordant.

It is only the one bath and the one bath-saddened methods which are of interest to the dyers of raw stock. The third method, namely that of applying logwood over a mordant, while it gives much faster colors, also deteriorates the spinning qualities of the stock to a very great extent.

The one bath method in detail as applied to raw stock is as follows: A bath is made up containing for 500 pounds of raw cotton, 90 pounds logwood extract, 45 pounds cutch extract, 13 pounds bluestone and 25 pounds soda ash. Enter the cotton at the boil and boil until the stock is well wet out. Then shut off the steam and work in the cooling bath for eight hours. Take out the cotton and allow it to stand without rinsing over night. This is to allow a thorough oxidation of the color. If this black is not deep enough it may be returned to the dyebath, which has been replenished with about 60 per cent of the starting amounts and the whole operation repeated.

This black is produced in one bath owing to the reaction between the bluestone and the soda-ash with the formation of a carbonate of copper, which is a mordant for logwood. Fairly fast dyeings are produced in this manner, but the fastness may be improved by giving the material an after-treatment in a fresh bath at a temperature of 160 degrees Fahrenheit with the following ingredients: 4 pounds chrome and 3½ pounds bluestone. This after-treatment will remove some of the color, so the same allowances must be made, as are made in the dyeing of after-treated direct colors.

A method which was used in the days when all the work was done with logwood is as follows. This method is of interest for the dyeing of cotton and also the coloring of shoddy with a wool content as low as 20 per cent. For 500 pounds of shoddy make up a bath containing the following

30 pounds Copperas
15 pounds Bluestone
5 pounds Alum
5 pounds Bichromate
25 pounds Sulphuric Acid.

Enter the material at the boil and boil for one-half hour. Lift and enter into the dyebath which is made up of 350 pounds of Logwood. The material may be entered into the boil and then boiled for 15 minutes. Shut off steam and work in the cooling bath for four hours.

It will be noted that in the dyeing of cotton with logwood, the coloring matter seems to act in its relation to the different fibers in the same manner as the average direct color. At a low temperature the cotton is principally dyed and the wool is only filled up at a high temperature. This is one of the "over-a-mordant" methods, but is not the method by which logwood is applied to piece goods and yarn.

A method which is much used to produce greys and fancy shades with logwood, is a one bath method in which different components are used than in the first mentioned formula. This is the saddened method. Prepare a bath for 100 pounds of raw stock or yarns with the following, 5 pounds sumac extract and logwood according to shade;

enter into the dyebath at 140 degrees and work until the material is thoroughly penetrated with the color and then lift and sadden with an addition of copperas.

The addition of copperas to the dyebath produces a deep black precipitate. If yarn is being dyed it is necessary to lift the yarn while the dissolved copperas is added. Then the yarn is re-entered and worked until the color is thoroughly developed. For raw cotton it is not necessary to lift, but is sufficient to sprinkle the dissolved copperas in a dilute solution over the stock. This method is not used for the production of blacks or very dark colors, owing to the amount of logwood which is wasted in the dyebath. It will, however, produce very fast and level greys and may be shaded to either side by the addition of fustic or cutch. An addition of soda to the dyebath will help the logwood in going onto the fiber, but will prevent the other colors from going on. Grey shades produced in this manner are very fast to boiling water, but have no fastness to bleaching agents or acids.

The other method is of interest for coloring cotton and only cotton in the spun state is the mordanting method. For 100 pounds of cotton yarn or cloth, work the pieces in a bath of 20 per cent sumac extract, entering at the boil and working in the cooling bath for two hours. Squeeze and pass through a bath of pyrolignite of iron which should stand at about 6 degrees Tw. Without rinsing pass through a weak bath of lime water and then rinse.

The material is now ready to be dyed and may be dyed in a boiling bath using the required amount of logwood and fustic. This method gives a very handsome black, which possesses very good fastness to all things except acids.

In this connection it is well to state that there is no method of dyeing with logwood to produce colors fast to acids. The colors produced, may or may not be fast to rubbing. It all depends on the particular method which was used and the carefulness of the manipulation.

In some cases, especially where sulphur blacks are being used, it is not desirable to entirely replace the sulphur black with logwood, but rather to combine the two, so as to preserve the supply of the artificial dye. This may very easily be done by first dyeing the cotton with the sulphur dye, using only about one to two per cent of color. After the material is rinsed, it is ready for a topping with logwood according to the one bath method. It seems as if the dyeing made with the sulphur color acts as a mordant for the logwood in the same manner as direct colors are mordants for basic colors. To obtain a good black by this method requires the use of 30 per cent logwood extract on top of the sulphur bottom.

For the production of blues, use has been made of an indigo bottom and topped with logwood where a dull blue was desired. There is no other method of producing blues on cotton with the natural colors, except with the use of indigo. Indigo is applied to cotton in a reduced state and there are many methods of applying. Different vats are as follows: Copperas vat. Hydrosulphite vat. Zinc-lime vat.

The copperas vat is the best of the three methods. The dyeing of material with indigo requires the services of a dyer trained in the preparation and working of indigo vats. This subject will be taken up in detail in a future article.

For the production of yellows on cotton, use is made of the following natural dyes; quercitron bark, turmeric, and fustic. Of these there is only one which is of a substantive character, that is, it possesses properties which enable it to be dyed in a similar manner to direct cotton colors. This product is turmeric. It gives bright yellow shades which are noted for their lack of fastness to light. No doubt, however, it could still compete with some of the artificial yellows, which will not stand more than a few hours of sunlight.

Fustic, although it is still used to a large extent on wool, has never been used to any extent as a self color on cotton. It may, however, be dyed in the same manner as cutch. The yellows produced are duller in shade than those obtained either with quercitron or turmeric.

Quercitron bark also gives yellow shades and may be used either as a self shade or in combination, according to the following cutch method which is applicable to quercitron, fustic and cutch.

Cutch browns have been looked upon with favor for a long time, owing to the fastness and beauty of shade. It, however, is not fast to acids. An average formula for the dyeing of cutch is as follows: A bath is made up for 200 pounds of material, containing 30 pounds of cutch and 3 pounds bluestone. Enter at the boil and boil for one hour. Deeper shades will be obtained if the material is allowed to remain in the cooling bath for one hour longer. The material is now chromed in a boiling bath for one-half hour, using about four pounds of chrome.

There is also another use to which cutch may be put to good advantage, namely as a mordant when dyeing logwood blacks. An average formula for the use of cutch in this manner is as follows: For 100 pounds of material the bath is prepared with 6 to 10 per cent of cutch and 2 to 3 per cent bluestone. The goods are entered at the boil and boiled for 40 minutes and worked in the cooling bath for an equal period of time; then enter into a fresh bath of the required amount of logwood at the boil and work in the cooling bath for two hours or longer if necessary. By giving a fresh bath of chrome at a temperature of 140 degrees Fahrenheit, the color will be made much more fast.

Compound shades may be produced with cutch, fustic and logwood. In this case the logwood is the most fugitive color, but very fast combinations may be produced by dyeing the fustic and cutch over a sulphur dyed bottom. The cotton is bottomed with sulphur black in about a ½ to 1 per cent dyeing and after rinsing the material is dyed with cutch and fustic according to the receipt given for dyeing with cutch. Dyeings produced in this manner have a better fastness to acids than where logwood is used as the dulling agent. A great variety of shades may be produced in this manner. It must be borne in mind, however, that the cutch is the fastest product and, therefore the yellower shades which are made up largely of fustic, will not be as fast as the redder tones where cutch predominates.

Hypernic is one of the red natural dyestuffs which may be applied to cotton and may be used according to the general method for cutch. Hypernic gives as a self shade a dull bluish red which possesses fair fastness to washing and light.

Madder, the only other natural red dyestuff which is applicable to cotton, produces upon an oil mordant, the so-called turkey red. The process of dyeing turkey red on cotton is very long and laborious, but it is the only method of producing a good shade of red. Turkey red is not applied to raw cotton as it is detrimental to the spinning qualities of the fiber.

While not within the list of natural dyestuffs, it is well

to remember the old, well known color, aniline black. Aniline black is too well known to take up space at present, but it is well to remember that use can be made of the one-bath aniline black and thus bring about a good reduction in the amount of artificial color used. The process is a very simple one and it is only necessary to immerse the material which has been bottomed with direct or sulphur black in a bath, containing, for 100 pounds of material,

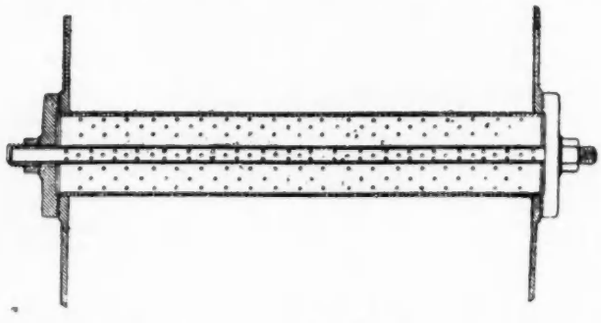
5 pounds Aniline Salt
15 pounds Hydrochloric Acid
7½ pounds Chrome

dissolved separately and worked cold for 40 minutes. It is then raised to the boil and boiled for 10 minutes. Rinse and soap. The bath should be brought to the boil slowly in order that the color may become gradually oxidized on and within the pores of the fiber. The only fault which can be found with this black is its tendency to crock. A gradual raising of the temperature will correct this trouble to a large extent.

## BEAM DYEING IN ENGLAND.

Cop dyeing and bleaching have been practiced for many years, and the advantage of applying the same principles to dyeing on the beam are obvious. The first attempts to dye cops were evidently failures. In Ormrod's patent of 1868 for instance, the cops were placed on a wheel which was rotated in the dye or bleach liquors. This would be an absolutely futile process. However, the perforated tube and the suction-cum-forcing action were quickly hit upon, and although there are few processes on which inventors have wasted so much time and money, cop bleaching was in a fairly satisfactory state at least as early as the 'eighties. Messrs. Blackwood, of Barrhead, bleached many thousand pounds of cops, warp and weft, for the writer somewhere about the year 1884 onwards, and very satisfactorily. Cop dyeing would suggest the possibility of beam dyeing for a warp on a perforated beam can be looked upon as a spindled cop on a large scale.

The first patent for beam dyeing was that of James Mallison, a Bolton, England, yarn agent, in 1873. He beamed the yarn on the perforated roller shown in the diagram, and forced the liquor through the central pipe



"from the inside, or *vice versa*." This is merely the essential principle, and Mallison's apparatus had to be greatly improved upon before beam dyeing became a successful practice. There is a long gap before the second beam dyeing patent was taken out in 1881. We give the principle entries:

*2,310—1881. Wm. Mather (Mather & Platt).*—The yarn is wound on a perforated pipe enclosed in a cylinder. The lower end of the pipe fits upon a valve seating which is fixed to the cylinder. Beneath the seating is a plate, and under it is a reservoir. A pipe is connected to the reservoir and leads to the suction side of a pump or injector or both. A pipe is carried from the delivery side of the pump to the top end of the cylinder. Liquor is forced into the upper end of the cylinder, and made to pass through the material wound upon the pipe and into the pipe through the perforations. The liquor falls into the reservoir below the pipe, and is again pumped round to the top of the cylinder continuously until the operation is completed.

*15,136—1886. Thos. Pickles.* Beetling apparatus is used in connection with the perforated tube so that the yarn is hammered, squeezed, or kneaded in order to assist the even distribution of liquor through the yarns.

*10,267—1892. Robert Shaw, George Young, and Wm. Crippen.*—A vacuum chamber is mounted above the beam, and the beam is supported by holders consisting of two pipes, which are in turn connected to a central pipe communicating with the vacuum chamber. These are two beams, one of which is empty. When the full beam is thoroughly saturated it is transferred to the second beam. The dye vats are movable, and can be raised or lowered by means of a platform. The liquor is pumped into the vacuum chamber, and then pumped again through the material.

*1,897—1893. P. Kelly.*—Pressure is alternately applied and released on fibers which are in a perforated cistern, so that the liquid circulates through the goods. A top plate descends on to the goods, squeezing them and forcing the liquor through them. By raising the plate the liquor is caused to flow back through the perforations.

*5,186—1894. G. Keighley.*—The warp is first treated with hot water to make it supple and ready to receive the dye liquor. The warp beam is placed in vertical position in the dye vessel, and the dye liquor is drawn through, but not under pressure. It may be rewound on a second beam if necessary, and air drawn through to ensure even dyeing.

*119—1895. L. Frostcher.*—The beam is provided with jointed pipes so that its position can be changed. Valves are provided, which communicate with air compressors, steam generators, and liquid containers. The goods receive treatment from the medium to which the valves are open at the time. Goods can be washed, bleached, dyed, or mordanted successively.

*436—1913.—Brandwood (Elton Cop Dyeing Co.).*—The beam consists of a thin shell of light metal reinforced by internal rings. Angle rings are formed at each end of the beam, and riveted to an outer ring or flange. The angle rings rest on a rubber washer through which an inlet pipe passes to admit dye liquor, and forms an airtight joint.

*515—1913. Brandwood.*—This is for treating fabrics on a beam with fluids under pressure heavier than the atmosphere. Combined with the upper part of a closed kier, and over the upper end of the beam is a screw or other pressure exerting device by means of which the beam is forced on to its seat, and a fluid tight joint is thus maintained against the high pressures used. Normally open, upper ends of the beam can be sealed by the same means if necessary.

*1,762—1913. Brandwood.*—In order to oxidize or develop the dyes in yarns on beams, air is supplied to the chamber in which the beams are placed in such large quantities that in passing radially inwards a substantial quantity passes through the substance of the fibers.

*10,564—1914. R. S. Heap.*—This is an improvement on patent 27,731—1909, in which the tubes conveying the steam or liquor to the beams are secured to the beams by

intermediate flanges with ball bearings placed between the end of the beams and the beam stand frame. The ends of the tube nozzles are forced against the intermediate flanges at the ends of the beams by a screw. A worm wheel on the nozzle pipe is operated by a worm, and rotates the beam. The improved device has a compensating spring placed in a plunger, which slides in a bracket secured to the beam stand. When the tightening screw is screwed home, the spring retains a small amount of compressive resistance. This prevents the beams from being crushed should undue pressure be applied when the ends of the nozzles on the reservoir pipes are conected to the end of the beams through the nozzles being forced against the beam ends by a screw.

*12,219—1914. Brandwood.*—To get the desired reversal of flow of the dye liquor in the simplest manner possible, two pumps are provided instead of one as formerly. One pump operates at a time and in an opposite direction to its fellow. To reverse the flow, it is only necessary to stop the working pump and start the other.

17,355—1914. *Brandwood.*—This is an improvement on 436—1913. As a further means of strengthening the beam and for using a minimum amount of nickel or other metal unaffected by acids or alkalies. The supporting flanges at the end of the beam may be of iron, provided that a liquid tight joint is formed between the flange and the nickel covering plate, which comes in contact with the fabric and liquor. Instead of using nickel sheets for the construction of the beam, it may be made of iron coated with nickel.

It will be seen that those highly successful cop dyers, the Elton Cop Dyeing Co., were responsible for important improvements in beam dyeing, and we give some extracts from a lecture on the subject delivered in the U. S. A. by John Brandwood, managing director of the company, who sums up the chief advantages as follows:—

1. The cost of beaming or dressing is entirely saved.
2. The cost of dyehouse labor is reduced.
3. The production from the loom is increased about 10 per cent. This is because all the elasticity and the full strength of the yarn is maintained.
4. The cost of dyeing materials is reduced.
5. No streaky or uneven dyeing—perfect penetration, every particle of the fibre being equally permeated and not plastered on the outside as in chain dyeing. Faster and brighter colors—no broken or damaged yarn—no beaming room required, and not more than a quarter of the dyehouse room—easy and reliable matching of dyeings.

Some of these advantages are not quite obvious, and Mr. Brandwood would do well to give his reasons more fully.

ESSENTIAL REQUIREMENTS.

1. Dye the whole set of beams of one color at one operation. For instance, where, say, six beams of indigo blue are required for a set of denims or chambrays, the whole six beams must be dyed together at one operation, and the color must be even and fast—in short, perfect.

2. The plant must be equally suitable for all classes of colors so that the same plant, with a modification of treatment, will dye equally well all classes of colors, and dye each class of colors as economically as possible.

3. It must use a section beam of the usual size that will hold 300 lb. of yarn and can be run in the warper, in the dyeing apparatus, and in the slashing frame without trouble.

Beam dyeing is of no service to the manufacturer who uses little colored warp and a great variety of colors in the manufacture of his goods. Take, for instance, a manufacturer of shirtings. He will use many colored ends and several colors in a piece of cloth. Beam dyeing is of no service to him, for he could not use a beam, or even half a beam, of one color in any cloth he makes. Here beam dyeing is obviously not suitable or economical. The way for him is to dye in a smaller way than the beam, viz., in the cheese or spool. Cheese dyeing offers advantages in economy of production that makes it a sound business proposition. The cheeses or spools are put behind the slashing frame, and run along with the beams or grey yarn, and in this way the unnecessary labor in beaming is cut out. There is, however, nothing like the saving effected as in beam dyeing, for the cost of manipulation in dyehouse labor, dye materials, and steam, is practically as great as in chain dyeing. Still, the beaming is eliminated, which makes it the most economical way of producing goods of this kind in which only a small minority of threads are colored.

The plant or apparatus is constructed in an ingenious way, making it equally adaptable to the warper, the dyeing apparatus, and the slashing frame. It is made from metals that are in no way affected by any chemical or dye liquors used in a dyehouse. It is no heavier or bulkier than an ordinary wood section beam. It holds 300 lb. of yarn, and cannot get damaged by rough handling. This dyeing cylinder is filled in the ordinary way in the warper, but on the warper there is a simple attachment which enables the beam to be wound to any degree of hardness or density required for dyeing; for in beam dyeing, as in any other method of dyeing, different qualities of cotton behave differently in the dyebath, and also different colors require different treatment. Hence the need for controlling the hardness or density of the beam. The attachment mentioned not only controls the density, but ensures it being uniform throughout the beam—so essential in beam dyeing. It is a single roller covered with special material, which assists the yarn on its warp on to the beam by travelling at a greater surface speed than the yarn itself, or retards the yarn by travelling at a slower surface speed, as may be required. An arrangement of levers and clutch ensure the roller being out of action just before the beam stops and until just after it starts up. The speed of the roller can be easily adjusted. It is impossible to imagine any other way of accomplishing this object.

The dyeing apparatus itself may be constructed to dye any number of beams, the general rule being to dye the full number of beams for each set at one operation. The beams all automatically find their positions in the dyeing chamber and are not taken out until they are finished and ready to go to the slasher. The dyeing is, of course, done in the vertical position and in a closed chamber under pressure greater than that of the atmosphere, and the apparatus can be immediately adapted so as to dye indigo, indanthrene, or any of the vat colors, azo, developed and sulphur colors under the conditions most suitable for each dyestuff.

Mr. Brandwood and his two brothers, who have studied this problem pretty closely for the last twenty years, began by dyeing beams in the horizontal position. In all compact dyeing we are quickly compelled to recognize the axiom that no two things can occupy the same space at the same time.

and the deadlock in trying to dye beams in the horizontal position is that air pockets will form in the upper part of the beam, and cannot be gotten rid of. One makeshift was to rotate the beam during the dyeing operation, but it was only a makeshift, and a poor makeshift at that, for all that generally happened was that the air pockets just stayed there, the result being patchy, spotted, and uneven dyeing. The only right, safe and certain way, he claims, is to dye in the vertical position in a closed chamber, and this principle, arrangement, and apparatus is patented in all countries by three patents. Further, this arrangement enables any number of beams to be dyed at one operation, and the space required is not one quarter of the space required for a chain dyeing plant of a similar capacity.

Another unique feature of this system is the oxidising of vat colors. In the earlier attempts vacuum was utilized, but even a perfect vacuum, if it could be got, is not powerful enough for this purpose. Then air pressure was applied up the center of the beam, and was found to be but little better, for the effective pressure was lost in its radiation outwards, and so the color was only partially fixed, and was uneven. This system is unique in that the air pressure is applied on the outside of the beam, and so the mean effective pressure is maintained all the way through the beam, and the whole set of beams are oxidized together at one operation.

By no means an unimportant feature is the simplicity and reliability of matching the dyeings, and the ease and regularity with which one batch of beams after another can be matched off. The Brandwood system seems to have satisfactorily solved the problem of beam dyeing, and it is evident that it would be just as suitable for bleaching.—*The Dyer & Calico Printer.*

# Notes About Men You Know.

W. P. HAMRICK has been promoted to the position of general superintendent of the group of mills which comprise the Hampton Cotton Mills Company. This company is a subsidiary of the Parker merger and consists of the Olympia, Richland, Capital City and Granby mills in Columbia,

W. P. HAMRICK.

besides some mills in other sections. About 275,000 spindles and 1,000 looms are operated by the Columbia division. Mr. Hamrick had been superintendent of the Olympia mill eight years.

T. M. McNiel, superintendent of the Ottaray mill of Union, will fill the position made vacant by the promotion of Mr. Hamrick.

Though still a young man Mr. Hamrick has held many places of responsibility with different manufacturing companies. He is 44 years old, 30 of which has been devoted to mill work. He has been superintendent separately of three of the mills in the group after having been divisional head in other textile plants. His specialty was card room work. After serving his apprenticeship with the Clifton Manufacturing Company in Spartanburg county and with the Pacolet mills as a card hand, Mr. Hamrick became the overseer of carding for the Pacolet mills, where he remained 13 years. He then came to Columbia to fill a similar position with the Granby mill and later to the Olympia. His next promotion was to the assistant superintendency of the Richland mill, to be advanced to the superintendency jointly of the Richland and the Capital City mills. He was then transferred to the Olympia mill superintendency, where he remained eight years, until his present promotion to the position of general superintendent.

Always deeply concerned in all movements which touch the social or economic life of the people under him, Mr. Hamrick has played an important role in organizations looking to the betterment and higher efficiency of the mill workers. The cooperative store, which has had a remarkable success in the Olympia village, received much attention from Mr. Hamrick, he having been the president of this from the inception of the idea. He has also been president of the Mill's Young Men's Christian Association and a positive leader in making the association a factor in the mill community.

G. T. LASHLEY has resigned as overseer of carding and spinning at the Glen Raven Mills, Burlington, N. C., to become superintendent of the Hopedale Mills, of the same place.

L. E. KERR, general manager of Watts Mill, Laurens, S. C., has returned after a visit to New Bedford, Mass.

GEORGE S. HARRIS, superintendent of the Lanett Cotton Mills at West Point, Ga., has been spending his vacation in Boston. During his visit he purchased a new automobile and will drive the car from Boston to West Point on his return. Mr. Harris is accompanied by Mrs. Harris on his trip.

P. J. MCNAMARA, manager of the Lanett Bleachery and Dye Works at West Point, Ga., left for New York about the middle of August to look over the dye stuff situation there. Mr. McNamara mixed pleasure with business by going via the Savannah Line of steamships and was accompanied on his trip by Mrs. McNamara.

L. F. EDWARDS, president and treasurer of the Mallison Braided Cord Co., at Athens, Ga., and the Edwards Mills at Crawford, has been away on a vacation trip during the past month.

LANDON A. THOMAS, president of the John P. King Mfg. Co., Augsta, Ga., is visiting the Panama-Pacific Exposition at San Francisco.

T. S. RAWORTH, president and treasurer of the Sibley Mfg. Co., Augusta, Ga., was visiting in the New York commercial district during the past month.

GEO. R. STEARNS, president and treasurer of the Riverside Mills at Augusta, Ga., is one of the southern visitors present at the Panama-Pacific Exposition at San Francisco.

A. K. PRATT, who for 15 years, has been associated with the Whitin Machine Works, Whitinsville, Mass., acting as their weaving expert, has been appointed assistant superintendent of the West Boylston Manufacturing Co., manufacturers of tire fabrics and specialty goods, Easthampton, Mass.

J. P. Hartsoe has been transferred from superintendent of the Delburg Mills, to superintendent of the Linden Mill, Davidson, N. C.

O. J. BARNES, superintendent of the Rushton Cotton Mills at Griffin, Ga., is taking a trip through the West for health. B. R. Westmoreland is acting as superintendent during the absence of Mr. Barnes.

ARTHUR L. GRIFFIN, formerly connected with the Greenville offices of the Parker Cotton Mills Corporation, has been transferred, as manager of the Columbia group of the Parker Corporation, with headquarters at Columbia. He expects to take up his new work on September 1.

H. GOULD WELBORN has resigned his position as president of Hampton group of the Parker Cotton Mills Co.

JAS. A. GREER. has resigned as editor of the Textile Manufacturer of Charlotte to become Traveling representative of the Mill News.

F. W. GURRY has resigned as manager of the Postex Cotton Mills, Post City, Texas.

T. W. HARVEY, of Charlotte, has accepted the position of superintendent of the Cherryville Mfg. Co., and the Melville Mills Cherryville, N. C.

JAMES BLUE has been promoted from night superintendent to superintendent of the Delburg Mills, Davidson, N. C.

R. T. COMER, formerly superintendent of the Pioneer Cotton Mills, Guthrie, Okla., will be superintendent of the new Hillside Mills, LaGrange, Ga.

JOHN ELIOT, who has been employed in the Lancaster Mills for about two years, has been made assistant superintendent of the Stark Mills, Manchester, N. H.

C. C. DAWSON has resigned as superintendent of the Melville Mills, Cherryville, N. C., to accept a position with Stuart W. Cramer of Charlotte.

H. EDWARD PICKERING, who has been assistant superintendent of the knitting department at the Tremont and Suffolk Mills of Lowell, Mass., has resigned to accept the position of general manager for the Peerless Knitting Co., of Mattapan, Mass.

WARREN WHITEHALL, of Groton, Mass., has accepted a position at the Franklin Mills, Franklin, N. H., as chemist.

ROBERT A. TAYLOR, of Greenville, S. C., has been granted United States letters patent No. 1,150,402, for an improved shuttle tension.

J. F. LOCKEY, formerly superintendent of the Athens (Ga.) Mfg. Co., has accepted a similar position at the Raeford (N. C.) Mfg. Co

H. K DREW, superintendent of the Union-Buffalo Mill, Union, S. C., is spending his vacation in Rhode Island.

C. H. GOODROE has resigned as superintendent of the Perkins Hosiery Mill, Columbus, Ga.

DANA D. BRAYTON, at a meeting of the directors of the Durfee mills, Fall River, Mass., was elected president of that corporation, to succeed John Jencks Brayton, who died recently.

W. H. GIBSON, JR., has been promoted to superintendent of the Fairmont (S. C.) Mfg. Co.

LEWIS W. PARKER, formerly head of the Parker Cotton Mills Co., has joined the editorial staff of the Greenville Daily Piedmont.

GUY R. LEWIS has been promoted from assistant superintendent to superintendent of the Kentucky Cotton Yarn Co., Louisville, Ky.

HENRY W. ATKINSON, of Jacksonville, Ala., has accepted the position of general manager of the Demopolis (Ala.) Cotton Mills.

## BRITISH COTTON TRADE SITUATION.

The prospects in the British cotton-manufacturing industry, according to English trade reviews, remain very uncertain, although during December, 1914, a slight improvement was reported. Imports of raw cotton in November were only 1,307,849 centals (of 100 pounds each) against 3,510,629 centals in November, 1913. Exports of cotton yarn in November were 9,547,900 pounds against 18,247,600 pounds in November, 1913, and of cotton piece goods 306,666,600 yards against 563,650,100 yards. The value of British cotton piece goods exported was $20,384,688 in November, 1914, and $38,488,681 in November, 1913. *The Textile Mercury*, of Manchester, adds:

Many spinners and manufacturers are spinning and weaving quantities of yarn and cloth in the hope that there may be a call for the products later on; in other words, the present production is in excess of the demand. This means loss. Employers could have withstood the present strain much better if the months prior to the war had been reasonably profit yielding. Some firms, of course, have done very well during the past year—spinning and manufacturing concerns with a high and long-standing reputation, which go on from year to year and with well-deserved success.

The Tattersall analysis of stock-taking results of 64 English cotton-spinning companies shows that during 1914, 32 recorded a loss and 32 made a profit; the aggregate loss amounted to $344,806 and the profit to $362,598. This left a profit of $17,792, if spread over the 64 firms; the combined share capital represented was $10,971,510, and the loan capital $5,460,972. A profit of $17,792 thus works out at 1 per cent on the share capital. The results, however, compare badly with 1913, when the same number of companies distributed a profit of 13 per cent on share capital and 9 per cent on share and loan capital combined after making allowance for the usual financial provisions. The 64 firms owned 3,197,524 weft spindles, 1,846,686 twist spindles, and 326,464 ring spindles. Mr. Tattersall reports that the year opened favorably, but that a depression set in about the end of June, and this was followed by a period of organized short time. After that came the war, under which the trade is still suffering.

# Practical Problems Discussed by Cotton's Readers

We invite our readers to make use of this department for the discussion of any and all problems arising in the mill or the finishing plant. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. The editors do not hold themselves responsible for any statements of opinion or fact which may appear in this department unless so indorsed. This department is open to all. Suitable letters are paid for in cash.

## AN EMERGENCY PUMP REPAIR.

EDITOR COTTON:

The accompanying illustration, Fig. 1, shows an emergency repair on a Worthington underwriter 18 x 10 x 12 duplex fire pump of one thousand gallons per minute capacity, which we made here at the No. 2 mill. The water end of this pump was cracked at both ends of the hand-hole plate shown in the illustration inside the chalk marks, the crack extending almost in a straight line with the long diameter of the plate around nearly to the boss to which is attached an individual hose connection.

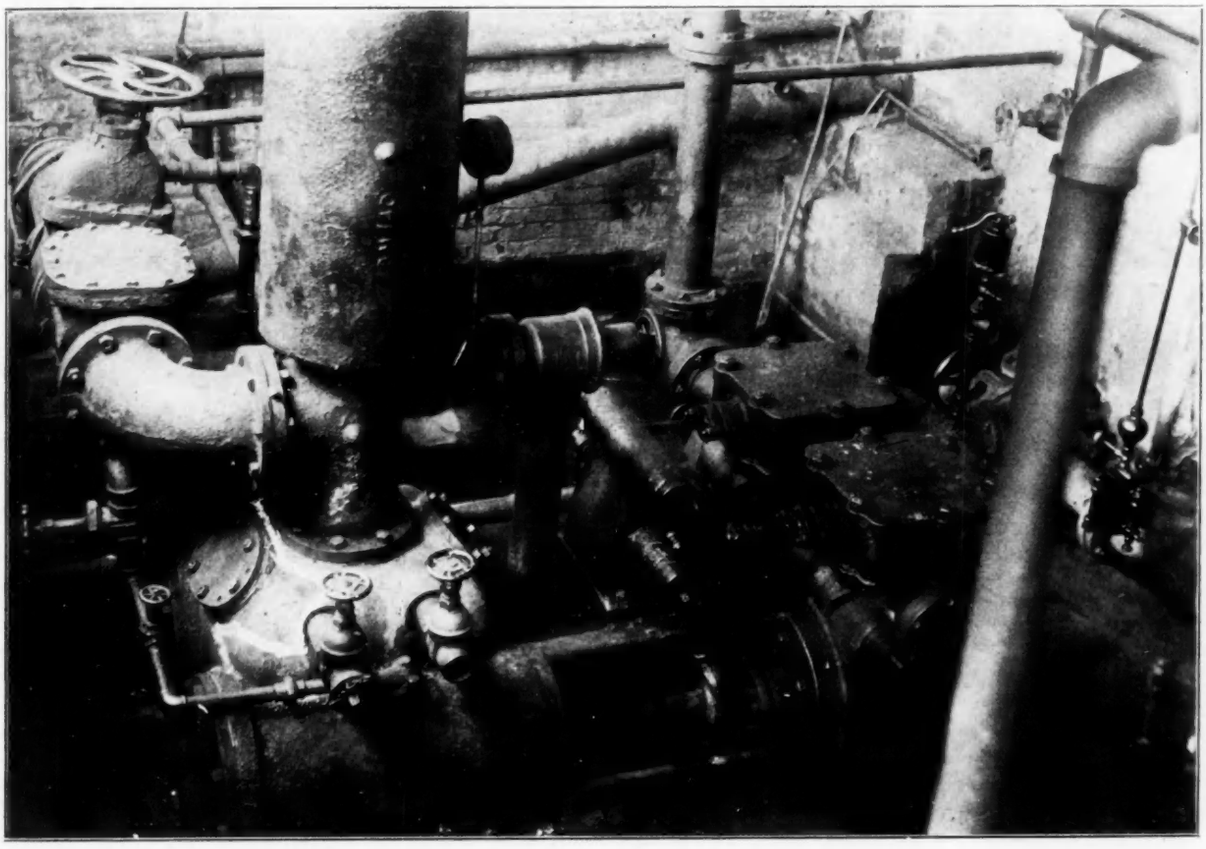


FIG. 1. THE PUMP AFTER THE CRACK WAS WELDED.

The cost of a new water end casting would, as you can easily note from the photograph, be at least several hundred dollars, to say nothing of the cost of installing this casting when it was received from the builder.

The repair was made directly in the pump pit without dismantling the pump by the use of an oxy-acetylene welding outfit and at a total cost of not to exceed $25 to $30.

One of the greatest difficulties encountered in making this repair was to so localize the heat that the expansion and contraction caused thereby would not injure the valve plate which is located just over the cylinders and just under the hand-hole plate in question. This valve plate, as in all pumps of this character, is full of threaded holes for the valve seats and cages.

Another difficult feature of this repair job was because the crack was located on a rounded corner so that a great deal of the work was what you might term "up-hill." In doing welding repair work with steel, the metal can be made to stick almost anywhere the operator desires, while in welding cast iron, the metal beomes fluid and flows by gravity. Therefore, in this case, the operator necessarily had to construct a dam of metal on the lower side of the crack and chiseled intersection which he had formed in order to flow the melted metal back to the point where it joins the highest part of the weld.

After the finished joint was made then the extra metal which had served as a dam was melted off by the torch and the whole job smoothed up.

Another difficult feature about this particular job was the apparently rotten condition of the iron itself. It appeared to be saturated with some chemical absorbed from the water to the extent that it was weaker in some spots than in others. This was demonstrated by the fact that after welding the crack, the pump was put under test and

a new crack developed just above the old one, and in the old metal adjoining the new metal flowed in. Then this crack had to be chipped down to the usual V-shaped groove and the weld again made. This was done three times before enough metal was incorporated into the job to make it hold the pressure of 150 pounds which was desired.

The first crack extended from about the ends of the hand-hole plate to the lower corner of the rectangular chalk mark shown in the photograph, on each side of the pump. The next crack was immediately above it and the third crack almost to the top of the chalk mark as shown. Owing to the location of the pump and connections it was impossible to show more than one of the welded sides in the photograph.

After the repair was completed the pump was carefully tested and is in a perfectly satisfactory condition.

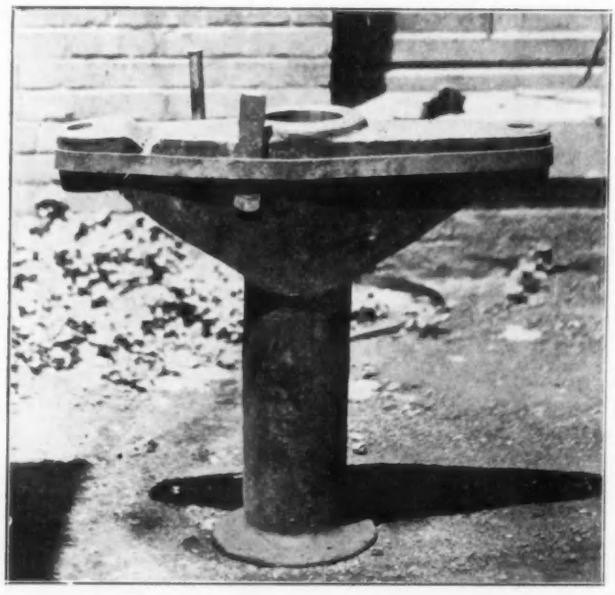


FIG. 2...A JOB READY FOR THE WELDER.

Not only do we use this machine on emergency repair work, but also in the regular repair work around the mill and shop we find it exceedingly convenient. The illustration in Fig. 2 shows one part of a hydraulic repair shop press for forcing shaft couplings on and off the ends of line shafting and on similar work. This machine is a twenty-five ton machine and as is seen by the photograph, it lost an "ear" while doing a job. This end has been chipped down forming the V-shaped opening necessary to begin welding and is clamped in position ready for the welder to begin his work. Other work for which we find almost daily use for the machine is in the repairing of such breaks as logger-heads for pickers, looms, swords, gears, pulleys, and occasionally loom sides.

W. W. Wallis. (Lanett, Ala.)

## RUNNING AFTER HELP.

EDITOR COTTON:

In reply to A. M. Oliver in the July issue of COTTON would like to say that I've had 19 years of practice, am a textile school gradaute, and have held the best ring spinning position in Rhode Island, including spooling and warping; also I have run after good men more than once. In one instance I advertised in the local papers for a second-hand of ring spinning. A man came up the following day well recommended by some of his friends. After a week I found to my sorrow that the man in question had spoiled yarns to the value of his wages for three months, and I fired him the same day.

Another instance was where I employed a section hand who knew it all. While going through his section the third day after I employed him I found a frame stopped for a breakdown at 7:45 A. M. and going through his section for the fifth time at 4:30 P. M. I still found the same machine stopped. I released him of his worry immediately. The break referred to could have been repaired in fifteen minutes by a competent man. If Mr. Oliver ever holds a responsible position as overseer of a department where he has three second hands and ten section men, he will find that it will pay the company and himself to run around for good men.

Student (R. I.)

## LONG CHAIN BEAMING.

EDITOR COTTON:

I am not an expert by any means, as your correspondent asks for, yet observant enough of long chain beaming to cite a few causes for yarn breakage at the beaming frame, therefore I will give a few reasons that have appealed to me.

Threads sticking and breaking out at the raddle are due to many causes, and a little attention to details will no doubt eliminate the trouble.

Warps that are dyed in an unclean vat, or to be more explicit, in a vat that contains a sediment in the bottom caused by the accumulation of insoluble matter, and through which the yarn passes, pick up some of this sediment and even extra washing will not clear the yarn enough to make it beam well.

Insufficient washing of warps after they have been dyed will also cause sticking-up in the beamer. All the loose dye and impurities taken on by the yarn in its passage through the vat, must be cleaned off or else this foreign matter will have a tendency to cling together, even up to the comb, when one or more threads are sure to break out.

Warps that have not been thoroughly dried will also cause trouble by sticking, and I can recall many cases where this oversight in the dye house has given the beamer lots of misery, before he found out exactly where the fault was.

Crossed ends in the warp is another drawback to first-class beaming, and one of the things that causes the most serious trouble, as one crossed end coming up suddenly against the comb, sometimes breaks out a half dozen other threads.

Rolled warps, due to excessive twisting and turning during the process of dying, is one more item to contend with, and sometimes is only eliminated by changing one or more processes in the dye house.

As to loose ends in the chain, a whole book could be written, and then the list would not be complete, but a few of the most important of them will be interesting.

Sluggish acting drop wires, whether they are electrical or mechanical, is one of the first and perhaps the most frequent causes, and the wire has only to hesitate to act for a few seconds, which is enough time to allow the broken end to disappear over the horn.

How many warper creels, even in a well regulated mill, if carefully looked over would be found in absolutely first-class condition? I dare say that at least every creel would have one or more bad wires.

Bad piecing by the spinner is another cause, where the splice has been made just strong enough to carry it beyond the comb or reed, where it will hang or else catch on the revolving ball, and the warper will continue to run long enough for the broken end to pass down on the ball, and the consequence is another loose end.

Dirty creels or floors, where the lint is allowed to accumulate, is another getter of loose ends. A gust of wind or a girl sweeping will blow some of this lint on the yarn. The yarn is moving and carries this lint up against the comb, where it catches and balls up and eventually breaks out the thread. There it sticks, the drop wire still held up and the warper still running, and again the consequence is another loose end, and maybe two or three more.

Snagged balls, due to improper handling by those who transport the balls from one department to another, should also be classed as a loose end provider.

Even when the warps are going through the dyeing process, they may be snagged or have ends broken out by coming in contact with rough or splintered overhead creels or reels.

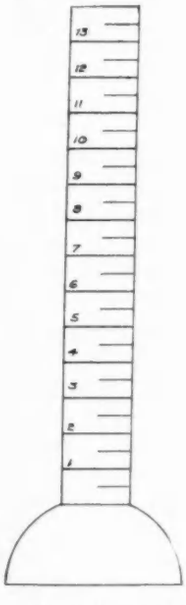
And still a great many more reasons could be found for yarn breakages and loose ends, but if summed up in one sentence, I should say that carelessness in the preparatory processes is the direct cause of all.

WORKER (La.)

## THE INDIGO SULPHATE TEST.

EDITOR COTTON:

Owing to my absence from home I failed earlier to see "Beginner's" inquiry in the June issue of COTTON regarding sulphate of Indigo as a test for chemic.




"Beginner" must get a carboy (about 9 gallons) and make a stock solution of Acid Sulphate of Indigo Paste, using 17 grammes of Indigo Paste to each pint of water; use hot water so as to get a perfect solution, free from specks. This Sulphate of Indigo can be bought for ten cents per pound. Get a glass cylinder 5½ inches deep, ¾ inch wide, and graduated like the drawing shown. Fill this up to the mark 8 with the Indigo solution and then carefully drop in a newly made solution of chemic standing at 1 degree Twaddle until the Indigo is decolorized. Now it is clear that—approximately speaking—if the chemic in the tube always shows this same result it is always 1 degree; if it takes more chemic to bleach the Indigo, then the chromic is weaker than 1 degree; if it takes less it is too strong.

Note the number of graduations it takes to bleach the Indigo with chemic at 1 degree and any other strength you may require can be figured from it.

Use the hydrometer only once, at the bginning of each lot of Sulphate of Indigo, to test it; afterwards depend on the Indigo alone, it is an infallible test for chemic while the hydrometer is not.

There is nothing scientific about this, it does not give the chlorometric degrees, etc., but it is a sound, practical test within the reach of any bleacher. A bleacher who depends on the hydrometer is apt to get into a hole at times.

William B.Nanson.

## A KINK FOR THE RING SPINNER.

EDITOR COTTON:

What is the cause of rings wearing sooner in one mill than in another, the rings having been made by the same company, is a question often asked.

In order to answer this question, let us consider the different kinds of care that the rings receive. When using new rings the traveler must be lighter than on old rings. The reason for this is because the surface of the ring is much rougher when new than when old. As the rings become smooth the travelers should be made heavier to stop ballooning, which is the cause of the rings wearing in most cases.

Let us consider for a moment what happens when the surface of a new ring has become smooth, and the travelers are not changed. In such a case, the traveler does not lag behind enough to create the required tension on the strand, consequently the yarn flies outwards or "balloons," as it is commonly called, and strikes the separator blades or one end strikes the other. When the end comes in contact with either the separator blades or other ends, a slight pull is given to the traveler, with the result that if the finger is passed over the surface of the ring at this point, it will be found that the traveler has worn a slight depression in the surface of the ring.

When new rings are allowed to get into such a condition, caused by not changing the travelers as the condition of the new rings demand, a heavier traveler at this stage will help matters very little, because the high and low places on the surface of the ring cause vibration continually. It is the custom in most mills to watch the new rings, and, as they become smooth, a traveler, one number heavier, is put on the rings and so on until they are perfectly smooth. In other mills where new rings are mostly used, I find no system in changing travelers, consequently the new rings suffer.

All experienced ring spinners will agree with the writer that "whipping" or "ballooning" is the cause of wearing the surface unevenly.

It should be seen that the travelers are changed as conditions demand and that no whipping takes place. This care prolongs the life of the ring, because if the revolving end does not come in contact with any other body, the path of the traveler is not disturbed, consequently the ring surface is worn evenly and remains smooth.

It must be admitted that the uneven wearing of the ring surface is due to "whipping," and that "whipping" is the cause of rings being turned over so often, and frequently changed as well. The only way to prolong the life of the rings is to have a system of changing travelers so as to prevent "ballooning," and in turn, not disturb the path of the traveler.

Wash. (Mass).

Shakespeare said that a man could go further with a smile than with a sword. Matthew Arnold declared that conduct was three-fourths of life; Emerson said if you give a young man good address, you give him mastery of fortune. He does not have the trouble of earning it, it seeks him.

## SOME THOUGHTS ON SPINNING.

EDITOR COTTON:

Although ring spinning and mule spinning differ to a large extent in twisting and winding on the finished thread, many things can be said in favor of each.

As regards the spinning frame it may be said that it occupies less floor space than a mule, that a larger production is obtained per spindle and it can be operated by any person, while the mule requires mostly men, which as a rule engender a dissatisfied spirit.

A spinning frame spindle will produce around 8 per cent more production than a mule spindle, the cost varying around 40 to 80 per cent, though the difference is not as great for fine yarns.

As regards mule spinning the consumption of power is from 145 to 155 spindles to one horsepower, against 65 to 75 for a spinning frame, the chief item in favor of the mule is that a much softer thread can be spun, which is due to the fact that the yarn is not burdened with a traveler. The yarn spun on a mule gives the face of the cloth a better appearance, besides the feel is not as harsh as that of a cloth made from ring filling yarn. The appearance of the face of the cloth, besides the feel, has created sales in more cases than one.

When a thread is ring spun this hairy or oozy appearance is lost owing to the amount of twist that must be inserted in ring spun yarn to give the yarn the necessary strength to drag the traveler, besides much of those short fibres are lost while passing the traveler. When you run single roving on the ring frame, you save a little on the card room by making a heavier hank roving, but you pay dearly for it in being obliged to insert extra twist on the ring frame besides not producing a uniform thread.

Running double roving will make a stronger yarn which improves the face of the cloth, because there is a less breakage of yarn and the yarn being more uniform and cozy gets under the buyers skin.

Talk about appearance, I once knew of a mill that created a great demand for its cloth, simply because they shipped it in cases; the cloth was no better than that of other mills, still it looked better in the case.

On the mule this hairy appearance is retained because the thread is not called on to drag the traveler, the yarn during winding being guided on the spindle by the faller wires.

Ring frame yarn is used for many purposes, which requires a varying number of turns to the inch in the yarn. Warp yarn is largely governed in the usefulness of its application, the chief point to consider is its liability to break on the loom.

Ring spinning is a task of enormous difficulty and is one that may never be solved. The reason for this statement is to make the readers think and study the object of spinning, and I know of no better way than to watch the operation of the traveler on the ring when the sun's rays are on it. What causes the appearance of two ends? What causes the ring to wear wavey? Think it over.

As I see it, the object of spinning is to produce a perfectly cylindrical thread of equal diameter through its length, and at the same time a thread containing at any point the same number of fibers in its cross section, a task, as stated, which seems impossible at this writing.

TAB (Mass.)

## INCREASING THE BREAKING STRENGTH.

EDITOR COTTON:

For the purpose of arousing beneficial discussion I should like to state an experiment which was tried in the cardroom of a mill the author is connected with. Previous to the installation of the new scheme, the system had been to make up a mix of cotton in one bin which was allowed to stand for a day while a similar mix was being used out of another bin. The stock used was 1/16 to 1/8 Middling and Strict Middling cotton.

Then the scheme was tried of putting aside all the 1/8 bales and using them together with some 1/16 cotton in the warp alone. One of the bins was utilized for this stock and the other for the regular filling mix. Thus instead of making only one mix it was necessary to make two separate mixes, but as each was made independently there was no confusion with no increase in help. This scheme of division was carried right along through the cardroom up to the respective spinning rooms. After the initial trouble of separating the warp stock from the filling, there was no further difficulty. Laps to be used to make the warp were marked on the side with a distinguishing color. This same color was carried right along through the cardroom on the various roving processes. The success of the new plan was apparent when the breaking strength jumped up from six to eight points on the average.

At times tests were made by mixing up warp and filling stock either back of the slubber or on the intermediates and it was found that the break dropped at once. It might be said that it was found necessary to take twist out of the slubbing and the following processes up to the spinning, thus increasing the production on those frames.

X. Y. Z. (Maine.)

## BLEACHING SKEIN YARN.

EDITOR COTTON:

I would like to see a discussion started in your paper regarding the bleaching of cotton yarn in the skein. Particularly am I interested in this bleaching in relation to the handling of it, whether for example it is best to bleach it in a tank, or in some kind of a patented machine. Such, for example as the Hussong or the Klauder-Weldon. I would be interested in knowing the opinions of your various readers on this subject and also the best method for handling this work if done in a tank.

J. C. (Mass.)

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Although the cotton textile industry is the most important branch of Brazilian native manufacturing, certain high grades of cotton goods not manufactured locally are imported, in which trade Great Britain with its Manchester goods has held first place. The total imports of more than $16,212,909 in 1913, however, fell to $6,801,723 in 1914. This loss of nearly $10,000,000 to Great Britain did not in any way augment the American-Brazilian trade in cotton goods. On the contrary, the comparatively small imports of cotton goods, amounting to only $231,642 in 1913, dropped to the insignificant figure of $94,049 in 1914. Part of this is due to the overstocking of the Brazilian markets in 1913, and part to the loss of consuming power of many sections of the interior since the "year of bad business" began in October, 1913.

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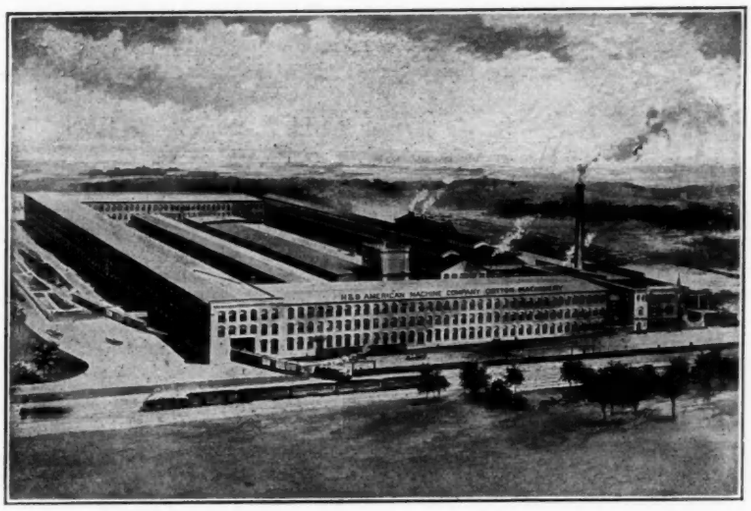
COTTON MACHINERY

Opening and Picking Machinery

Card Room Machinery



Spinning Room Machinery

Twisters for Wet or Dry Work

With Band or Tape Drive

H. & B. AMERICAN MACHINE COMPANY
PAWTUCKET, R. I.

# New Machinery and Trade Notes.

## The Proctor Automatic Boarding, Drying and Stripping Machine for Hosiery.

This new machine, which is shown in miniature in the illustration, is, as the name implies, automatic. It does away absolutely with every operation of the boarder except the actual placing of the stocking on the board. In doing this it eliminates thirteen distinct operations, as compared with the old style of board.

The stocking boards, which are made of aluminum, slide automatically along a table to the stocking boarder. They are upright, slant away from the man at the top and are in the most convenient position for boarding.

A receptable for holding the wet stockings is directly in front of the man, and is placed so he can reach the stocking with the minimum of movement. After putting a wet stocking on the board in front of him the man can turn this board around in any position he desires, to see that the stocking is boarded properly.

With the stocking on the board pulled down and straightened out, the man presses his knee against the table and a clever device grips the top of the stocking, holds it while being dried, and prevents it from shrinking. This ingenious device not only makes it possible to get the maximum length on the finished stockings, but also enables the man to keep out those objectionable little "pig-ears" in the heels and toes.

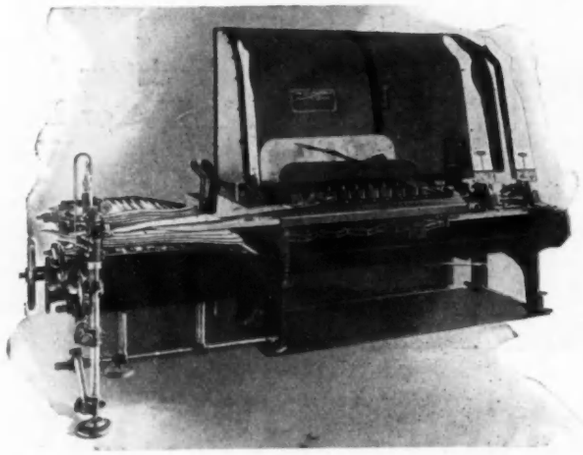
When the stocking has been put on the board and clamped, the board moves automatically away from the man and into the dryer, where a violent circulation of air, heated by means of steam pipes and circulated by means of a fan, dries the stockings.

In the dryer the board is moved continuously, by automatic means, from one end to the other. In its passage through the dryer the board still maintains the upright position it had when the man put the stocking on it. But as it comes out of the dryer it is laid down gently to a horizontal position. While it is in this horizontal position a set of flexible fingers grasp the toe and heel of the stocking and hold it while the board is gently withdrawn automatically. The board is then again raised to its former vertical position and moves slowly to the man ready to have another stocking put on it as before.

There are eighteen of these boards on each dryer when drying light and medium weight hosiery (twenty-four when drying heavy ribs). These boards all move continuously, so that by the time the man has put a stocking on one board there is another empty board in front of him. The speed of these boards can be increased or diminished very easily to suit the speed of the man. This is done by simply pushing a lever forward or backward.

Let us now go back to the point where the stocking comes out of the dryer and is taken off the board. When the board is withdrawn from the stocking an intermittently

sliding table is directly beneath it, and the stocking is laid flat on this table. Then when the board has been entirely withdrawn from the stocking the sliding table slides from under, the flexible fingers let go of the toe and heel, and the stocking is laid on another table. As each stocking comes out of the dryer this operation is repeated until twelve stockings are placed on a pile. Then an automatic carrier lifts the pile and moves it away so that another pile can be formed. These piles are moved into new positions every time a new pile is formed. The part of the table directly under the place where the stockings are taken off the boards moves up and down, so that when there are



twelve stockings in the pile the table is in its lowest position, and when there is one stocking in the pile the table is in its highest position.

This moving table is of sufficient size to take care of about nine piles of stockings. The machine never fails to count and lay in piles the correct number of stockings, so that the boarder's attention may be concentrated absolutely on the only operation he has to perform, that of placing the stockings on the boards.

Another feature of this machine which will appeal to manufacturers of full-fashioned hosiery is the fact that the stockings can be boarded "one up and one down," so that when they are automatically stripped off the machine they are laid in pairs and do not have to be sorted or paired up by the operator after they have been dried. This machine is manufactured by the PHILADELPHIA TEXTILE MACHINERY CO., Philadelphia, Pa.

## Heavy Duty Mill Engine for Australia.

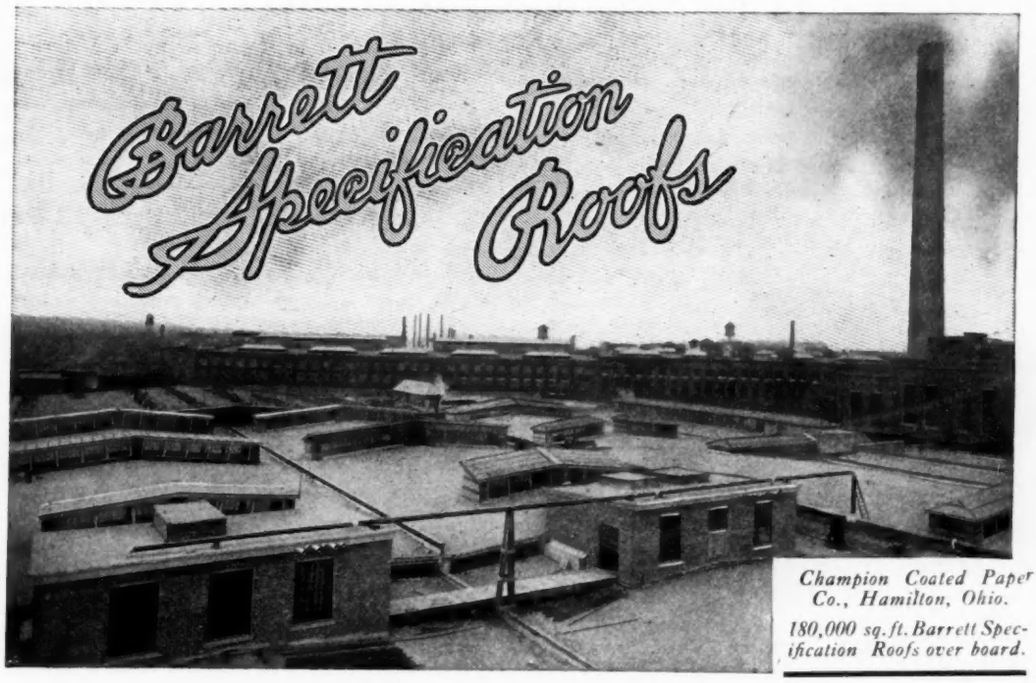
The Mesta Machine Company, Pittsburgh, Pa., has just received an order from James B. Ladd, consulting engineer, Philadelphia, Pa., for a 1,500 horsepower mill engine for the Broken Hill Proprietaries Company, Ltd., New Castle, N. S. W., Australia. The engine is for rolling mill service and is of the heavy-duty tandem-compound Corliss valve type. The cylinders are 30 inches and 54 inches in diameter and the stroke 48 inches. This engine, when installed, will make the fourth unit that the Mesta Machine Company has built for the Broken Hill Proprietaries Co., as three Mesta long-crosshead blowing engines, equipped with Mesta automatic plate valves (Iversan Patent) were shipped about two years ago. In the selection of a unit to be used at such a great distance from the works of the builder, simplicity and reliability are important points for consideration. A breakdown, which under ordinary circumstances would be a trivial affair, becomes serious under these conditions.

In preparing their Soluble Softening Oil, THE ARABOL MFG. CO., 100 William St., New York City, have succeeded in manufacturing a compound of absolute uniformity all the year around. It is claimed that it will stand the heat and will not sour in the hottest season. Those who use it prefer it to tallow and other oils and greases because it is more efficient and easier to handle. Being neutral it is suitable for close woven and strong goods. It gives a smooth finish to the warps, while the threads divide well on the lease rods, and the cylinder of the slasher remains clean.

## A New Over-Driven Extractor.

The accompanying illustration shows a new over-driven extractor that, while not exactly a new machine among the laundry trade, it is practically so among the textile mills of the country. The feature of this machine, which appeals to cotton manufacturers and finishers, is the fact that it very greatly reduces vibration. This feature is brought about through the curb and basket of the machine both being suspended from a tripod so that the vibration and jar really counteract themselves. The method adopted in constructing this extractor practically eliminates the use

of any special foundation, allowing the machine to be placed in almost any convenient spot. This machine is manufactured by the AMERICAN LAUNDRY MACHINERY COMPANY, Cincinnati, Ohio, and the careful workmanship, safety devices, oiling devices and friction pulleys, are features which will interest all up-to-date mill men. The favorable reception with which this machine has been received by a large number of mills speaks for itself. An inquiry addressed to this company, attention Mr. A. L. Stanley, will bring the fullest information by return mail.

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There are architects, engineers and owners who still allow their contractors to lay slag or gravel roofs their own way, subject only to general description. Such easy-going specifications are not fair to honest bidders. They invite the use of poor materials and workmanship.

Even if the use of labelled and reputable materials is required and a five-ply roof is specified, a mere difference in the procedure of application may lead to unsatisfactory results.

The Barrett Specificatin provides the easies' way to insure satisfaction.

In the words of the Underwriters' Laboratories, which recently completed an exhaustive and most gratifying investigation of Barrett Specification Roofs:

> *"These roof coverings are less likely to be defective as a result of improper workmanship than other roofings of the type."*

The Barrett Specification provides, in addition, a method of inspection after the roof is laid by exposing a sample cross-section so that the completeness of the work is easily ascertained.

Insist that The Barrett Specification be included *in full* in the roofing specifications and you'll be ordering a roof that will cost less than any other kind because it will give protection and satisfactory service for twenty years or more.

*Special Note* We advise incorporating in plans the full wording of The Barrett Specification, in order to avoid any misunderstanding. If any abbreviated form is desired, however, the following is suggested: ROOFING—Shall be a Barrett Specification Roof laid as directed in printed Specification, revised August 15, 1911, using the materials specified and subject to the inspection requirement.

*A copy of The Barrett Specification, with roofing diagrams, free on request.*

## BARRETT MANUFACTURING COMPANY

New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati
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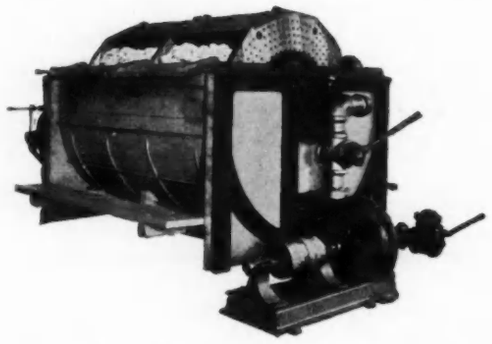
TRADE B MARK

## "Hurricane" Rotary-Circulating Machine for Bleaching and Dyeing.

In the latest "Hurricane" rotary-circulating machine illustrated herewith and built by The Philadelphia Drying Machinery Company, 6721 Germantown Ave., Philadelphia, Pa., several new features have been embodied and better work and quicker results are likewise obtained.

The inside revolving cylinder is subdivided into a number of pockets, which have perforated doors, partitions, and end walls. Through the center of the cylinder, there extends a perforated supply pipe, through which the liquor is



forced by means of a pump located on the outside of the machine. The perforated return pipe also extends along the entire length of the bottom of the tub and connects with the circulating pump.

By the proper arrangement of valves and pipe connections, the liquor may be forced from the interior of the revolving cylinder uniformly outward in all directions through the material contained in the various pockets and then returned back into the pump and circulated over and over again.

When desired, by changing the valves, a circulation in the reverse direction is secured, that is, from the circumference of the cylinder toward the center. The direction of rotation of the cylinder can also be reversed. By forcing the liquor for the desired length of time, first in one direction, and then in the opposite direction, through the pockets full of material, uniformity and more rapid results are obtained than in the older styles of machines which did not have this improved feature of positive circulation of the liquor.

Machines of this type have been installed with splendid results for handling both raw stock and hosiery. On account of the positive circulation of the liquor, it has been found possible to do the boiling, bleaching or dyeing, and also the soaping and washing of the material entirely in the machine, and without removing the goods, thus saving a great deal of handling and considerably reducing the cost of production.

The machines are built in various sizes, with cylinders made of wood, iron, bronze, or special metals, according to requirements.

## Why the Silica?

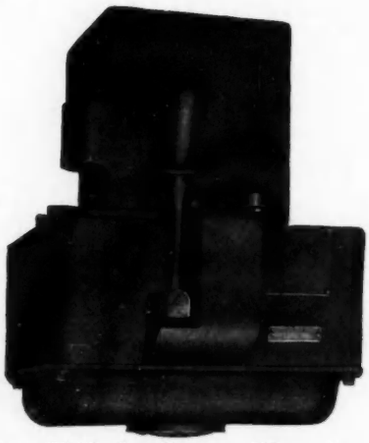
A twenty-four karat pure gold chain will not prove a durable chain. Neither will a pure all-graphite paint prove a durable protective covering. The copper alloy in a fourteen or sixteen karat chain insures durability. The silica of a silica-graphite paint adds durability and supplies just enough "drag" to prevent too thin a coat. Neither graphite nor silica alone provides so good a pigment as do both combined. Nature's own mixture of silica and graphite, *i. e.*, a natural formation in which the two are intimately attached has proven itself to be the best form of pigment because, unlike other forms where free silica is a constituent, the silica does not separate itself from the graphite and settle into a hard mass. Silica should be mined with the graphite so that particles of each cling to the other and do not settle when mixed with oil.—*Graphite.*

## Improved Industrial Type Oil Switch.

This type of oil switch is used in industrial establishments to control and protect induction motors up to 2,500 volts and 300 amperes. It can be mounted on a wall, post or other vertical flat surface, or by means of suitable supports on the machine operated by the motor. The switch is made by the GENERAL ELECTRIC COMPANY in both non-automatic and automatic forms; the first simply to start and stop the motor, and the second to cut off current from the motor automatically on the occurrence of an overload greater than that for which the overload trip is set.

Through a recent improvement in the design of the mechanism, a low-voltage trip can be added to the automatic switch as an attachment at any time. To the non-automatic switch, either a low-voltage trip or a series-overload trip, or both, can be added whenever desired. Both means of tripping are mounted inside the switch cover.

Up to 550 volts (except on 110 volt, 60 cycle circuits, where the trip coil only is sufficient), an auto-transformer



TYPE F FORM K-20 OIL SWITCH WITH AUTOMATIC TRIP AND LOW VOLTAGE RELEASE.

is used in place of the resistance previously required in series with the low voltage tripping coil. This transformer has taps to which proper connections can be made for the operating voltage. For 2,200 volt circuits, a new type voltage transformer replaces the transformer and series resistance used heretofore. The use of the new auto-transformer, or voltage transformer, makes the watt loss in the low-voltage device practically negligible.

On the switch with the time limit-overload trip, the calibrating tubes and dash pots are protected from injury by a cast iron guard which has been added to the equipment.

Switches can also be furnishd with covers arranged to mount a round pattern ammeter and provide, in addition to control and protection, a means of knowing at all times the amount of current being taken by the motor. This gives a continual indication of the motor load and the opportunity to detect trouble in the motor or its circuit.

**MR. MANAGER:—**

**You are interested in some, at least, of the following items, and we are interested in you having them in the best shape at the proper time:**

1—Seed and Meal Tags.
2—Warehouse Receipts, printed or lithographed.
3—Warehouse Tags.
4—Gin Tickets.
5—Tag Hooks and Wires.
6—Cotton Talley Books.
7—Cotton Books, for Bought and Sold Cotton.
8—"Montague" Addressing Machines for Shipping Tags, etc.

What are your requirements for the coming season? Let us serve you. Write us now!

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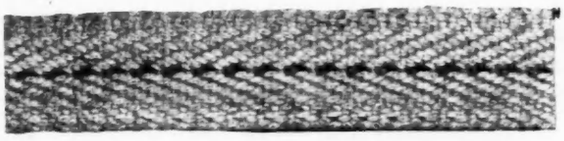
**The Printers and Stationers, Birmingham, Ala.**



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**Manufacturers of SPINDLE TAPES and BANDS**

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**Because** of the effective collection facilities he has for the handling of a large volume of collections and litigated matters in his well established New York, Chicago, Boston, Cleveland, Detroit and Atlanta offices, in charge of experienced collection managers, able counsel and capable assistants;

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Boston, National Shawmut Bank.
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## Lock Washers.

Millions of lock washers are used annually by the automobile manufacturers of this country to secure the bolts and nuts of automobiles and thereby safeguard the lives and property of the automobile traveling public against accident.

The jar of the gasoline engine operated at high speed and the severe strains caused by running over rough roads combine to loosen everything in the machine that is not permanently anchored.

In a weaving mill looms are conspicuously subject to wear and tear and one regular duty of loom fixers is the tightening of bolts and nuts that become loose. The reason is obvious. A 40 inch loom, for instance, on a plain weave operated at 160 picks per minute, on a 54 hours weekly basis makes 26,956,800 picks per annum (without allowance for stops). This represents a travel of nearly six feet per pick, or 27,773 miles per annum.

Unlike most conveyances the trips of the shuttle are short and there must be a complete stop and reversal of direction at every alternate pick. This necessitates a neutralizing of the momentum of the shuttle, and although the binder and check perform this operation, there is of necessity much strain and wear. The motions of the loom are largely through cams which produce a shock when operated.

Several years ago the Draper Company adopted a construction of loom frames where all joints are machined together, making a better fit at such joints and also more uniformity in measurements in the working parts of the loom.

Recognizing the old difficulty of bolts and nuts becoming loose and the resulting troubles which follow, they have

also adopted the example of the automobile makers and are now equipping their looms with positive lock washers in all places where they can be used. An actual count on one of their narrow looms showed 185 of these washers.

While this means an added cost to them, it also means a great reduction in wear and tear of looms to their customers, with a corresponding reduction in the labor of loom fixers and in cost of supplies. A recent report from a mill where new looms provided with lock washers are being started showed less general breakage of parts than usual and practically no call for tightening of bolts.

The illustration shows the appearance of a joint on the Northrop loom secured by the lock washer. Northrop looms are now being operated on practically all classes of cotton goods that can be woven with one shuttle; such looms make a saving in labor cost of weaving; improve the quality of the product and make an easier job for the weaver, at increased pay.

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"Man did not make the earth, and though he had a natural right to occupy it, he had no right to locate as his property in perpetuity any part of it."

## Automobile Owners Receive Good News.

The greatest boon to the automobile owners has just been given them recently in the form of a tire constructed double thickness. This added thickness in wearing surface makes the tires superior for real service as they are punctureproof and withstand great wear and hard service. Notwithstanding the many added features of these tires they are being sold now as an introductory offer at a special price. These tires bear a 7000 mile guarantee which is double that of some of the regular made standard goods. These tires are being sold direct to the consumer by the DOUBLE SERVICE TIRE AND RUBBER CO., of Akron, Ohio.

## Use of Graphite Brushes.

A rough and worn commutator will always produce sparking and not only cause annoyance and low efficiency during operation, but eventually make an extended and expensive shut-down for necessary repairs. It has been found that graphite brushes are excellent for use upon commutators because they are free from grit and are self-lubricating. Many users of electric power machinery have adopted Dixon's graphite brushes and results with them have been highly successful.

---

The NATIONAL ANILINE & CHEMICAL COMPANY of New York are now manufacturing aniline colors from raw materials produced in America, where formerly they made them from semi-finished products imported from Europe. They are increasing their production of aniline colors to such an extent that by the end of this year they will probably be making about four times as many colors in pounds as they have produced before. The rapid development of American manufactured aniline colors, as indicated by the work of this company, commands attention as an actual example of what can be done when the proper amount of perseverance and push is employed in the right direction.

---

There is much difficulty being experienced among the cotton mills now being obliged to use more of the old natural dye-stuffs, because both stock, yarn and warps run badly owing to the harsh feel, this being the effect of such dyes, most of which have to be used in connection with chemical salts, giving most undesirable results in this respect. Soluble grease is both a softening and lubricating agent designed to eliminate the trouble. It is being used very successfully among a large number of mills and no doubt there are many others that would be glad to know about it. Soluble grease is manufactured by BOSSON & LANE, Atlantic Mass.

---

THE KLAUDER-WELDON DYEING MACHINE COMPANY of Amsterdam, New York, announce the following new machinery equipment in southern mills: Muscogee Mfg. Co., Columbus, Ga.; Magnet Knitting Mills, Clinton, Tenn.; Harriman Mills, Harriman, Tenn.; Richmond Hosiery Mills, Rossville, Ga.; Davis Hosiery Co., Chattanooga, Tenn.; W. B. Davis & Sons, Fort Payne, Ala.; and Loudon Hosiry Mills, Loudon, Tenn.

---

Don't be afraid to tell the truth. It is a part of your honor.

*Spinning Tape Specialists*

*Established 1898*

Makers of tape for all kinds of tape drives and all makes of machinery. Makers of listings, leaders and all kinds of mill tapes

*Write Us*

BARBER MANUFACTURING CO.

LOWELL, MASS.

Concerning That Roof

**Painted Cortright Shingles All Over The Country.**

And some have been in use 28 years—absolute proof of their durability.

Don't bother about the high price of spelter and galvanized roofing. Finish your roof with this 28 year old success—Cortright Metal Shingles, made of tinplate and painted red or green.

Just as good looking, just as permanent; just as tight—and cheaper.

Write for particulars.

**Cortright Metal Roofing Co., Philadelphia and Chicago.**

JOHN D. LEWIS

Manufacturer of

Logwood Extracts & Hematine

Providence, R. I.

50% Better than ever from YOUR Standpoint

**SEVERAL NEW FEATURES** have been added to the "1912" Cloth Cutting, Folding and Winding Machine which **add at least 50% to its value to YOU.**

It will cut your cloth—fold the edges—roll it up and give you an exact measurement of every piece of cloth going through the machine.

It saves time, labor, machines and cloth.

YOU ONLY NEED ONE MACHINE where before it required two, and you get an **extra** strip from every bolt of cloth.

It cuts the corners of expense in every way and leads to more and greater profits.

THE ENORMOUS SAVINGS WILL INTEREST YOU.

Mail a card for complete information and prices.

When in need of special machinery, write me.

**J. A. FIRSCHING, 614 Broad St., Utica, N. Y., U. S. A., Dept. "C."**

CHINA CLAYS AND TALCS

Adapted for

Loading and Finishing

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MAIN OFFICE, 180 SOUTH ST., NEW YORK

ALUMINA SOAPALITE

THE MINERAL SOAP

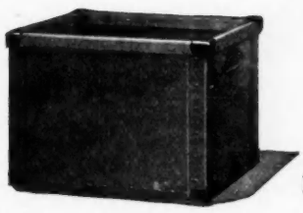
THE DETERGENT WITHOUT AN EQUAL

Washes thoroughly and quickly—rinses freely. Brightens and sets colors.

BOOKLET FREE

THE ELECTRIC SMELTING & ALUMINUM CO.

Lockport, New York



Diamond FIBRE

ROVING CANS
MILL BASKETS
BARRELS BOXES

Will neither dent nor break when subjected to hard usage. Stronger than wood, lighter than steel.

Write for Bulletin 12.

DIAMOND STATE FIBRE CO.

Bridgeport, Pa. Elsmere, Del.

Branches in Principal Cities.

## KNITTING MILL NEWS

**Notices of mill projects, additions or improvements are solicited for this department. Other notices pertaining particularly to the Southeastern section will be found in the Southern Mill Situation review.**

MICHIGAN.

GRAND RAPIDS.—The C. & D. Co. has been incorporated to deal in the knit goods, underwear, etc.; capital, $4,000. Incorporators: Bernard E. DeGraaf, Charles H. Perkins, Ralph H. Harnig and R. W. Clements.

NEW JERSEY.

TRENTON.—The contract for the erection of a three-story concrete and brick hosiery mill, 50 by 150 feet, for William F. Taubel, has been awarded to Harrison C. Rea Company.

NEW YORK.

SHERBURNE.—The Canasawacta Knitting Company has practically shut down its mill for a month, planning at present to start in full on September 1. Repairs and alterations will be made.

STAPLETON.—J. Berman has leased the building at 677 Bay street, and has installed machinery for making sweaters and bathing suits, trading under the style of Bermans Knitting Mills.

PENNSYLVANIA.

MILLHEIM.—The Millheim Knitting and Manufacturing Company has started a branch at Pleasant Gap, Pa., with 50 latch thread needle machines, 6 loopers and 10 ribbers.

Philadelphia.—The Philadelphia plant of the Concordia Silk Hosiery Company, Inc., is to be enlarged by the addition of a one-story building 40 by 60 feet.

PHILADELPHIA.—The Full Size Hosiery Company, owned by Brown & Vickerman, have equipped their plant at Tenth and Diamond streets with 22 latch needle knitters, one looper and one welter, on which they are making a line of 176 to 209 needle goods. They manufacture women's seamless cotton and mercerized hosiery.

PHILADELPHIA.—J. H. Blaetz has started in the hosiery business at 167 West Oxford street.

PLATTSVILLE.—The knitting plant of C. W. Unger has been purchased by Frank Kaiser. Plant is now being repaired and new machinery will be added. Mr. Kaiser purposes manufacturing only standard underwear. He will have in plant 14 knitting and 21 finishing machines.

READING.—A new factory has been established by Charles H. Cox for the manufacture of underwear.

SPRING CITY.—The Century Knitting Company is enlarging its Pottsown branch for the increased production of underwear.

WYOMISSING. — The Berkshire Knitting Mills have started work on the erection of a new five-story building, 240 x 40 feet, which when completed will double the output of the mill. The estimated cost of the new building will be $100,000, exclusive of equipment.

WISCONSIN.

MILWAUKEE.—Plans are being drawn for a new six-story building to be erected by the Phoenix Knitting Company, at Chicago and Milwaukee streets, at a cost of $100,000.

# Our Hosiery Machines

automatically set up and drop off each stocking and make the anti-ravelling course, and, in addition to the cost of transferring the cuffs of half hose and the sewing of the welts of women's hose, these machines effect very pronounced savings, for instance—in the case of half hose, the ordinary ribbed machine is eliminated entirely, and, of course, the first cost of this machine, its maintenance and floor space, together with the knitting waste, the cost of cutting the ribbed top and the ravelling waste, which in the ordinary practice is unescapable, are entirely saved.

Transfer menders are altogether eliminated and the expense and annoyance of training expert help is avoided.

In respect of the women's hose there is no expense for severing the stockings, no sewing machine operation and consequently no waste on account thereof and a marked decrease in loopers ravelling waste, due to the fact that the stockings are pressed off to a course and not left with a crooked unevenly cut edge.

**Established 1865.**

## Scott & Williams, Inc.

**88 Pearl Street**
**BOSTON**

**NEW YORK** **UTICA**

# MERCERIZED YARNS

## *Dyers—Bleachers—Gassers*

**Dyers of**

## *Colors Fast to SUN and BLEACHING*

# ABERFOYLE
# Manufacturing Company

**CHESTER, PA.**

**402 Morris Building**
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**CHICAGO**
**746 Insurance Exchange**

## Clinton H. Scovell & Company

**Certified Public Accountants**
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**Textile Cost Accounting**

## American Soap & Washoline Co.

Established 1861.
**COHOES, NEW YORK**
**Largest Manufacturers of Textile Soaps and Soap Powders in the United States.**

**FOR ALL COTTON MILL USES.**

The following concerns are now handling our Goods and will supply you at Factory Prices.

Waters-Garland Co., Louisville, Ky.; Carolina Supply Co., Greenville, S. C.; Southern Belting Co., Atlanta, Ga.; Montgomery & Crawford, Spartanburg, S. C.; Sullivan Hardware Co., Anderson, S. C.; Charlotte Supply Co., Charlotte, N. C.; McAnelly Hardware Co., Huntsville, Ala.

## DOBBINS SOAP MFG. CO.

**PHILADELPHIA**
**Makers of the Celebrated**
**Dobbins Cotton Softener**
**Also**
**Olammon**
**(A concentrated Scouring Compound)**
**and**
**DOBBINS ELECTRIC MILL SOAPS**
**Working Samples Cheerfully Furnished Gratis.**

**You Will Be Delighted With**

## Howe Mill Crayons

**Try Them and See**

## Howe Mill & Crayon Co.,

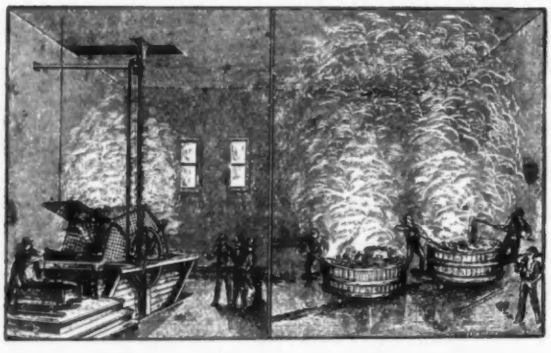
**LOWELL, MASS.**

**Free Samples on Request**

## Some Delahunty Products.

The dyeing of cotton in its natural state, or what is known as raw stock dyeing, has come into practically universal use in colored goods mills. New dye stuffs and formulae, and most important of all, improved equipment, have brought this change about. Formerly, it was believed that brilliant shades and satisfactory colors could not possibly be obtained by dyeing the raw cotton and then spinning the stock into yarn. This was no doubt true, in a great measure, when the old system of dyeing in stationary vats or kettles was in vogue. This method was cumbersome, costly, and results, as a rule, were very unsatisfactory. Consequently, raw stock dyeing did not receive much consideration until a change occurred in the methods employed. The introduction of what is now known as the revolving cylinder type of machine, built by the Delahunty Dyeing Machine Company, proved to be the one thing necessary to make raw stock dyeing popular and successful among the mills. Large numbers of these machines were rapidly installed and hundreds of them are now in use.

The accompanying illustration is from a "cut" made for Joseph P. Delahunty in 1880, and was used in an advertisement showing the difference in the methods of dyeing

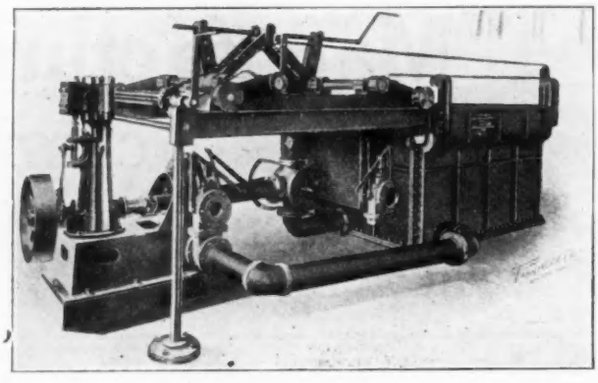


raw stock cotton, and wool in tubs by hand, and in the Delahunty revolving cylinder dyeing machine, which was placed on the market at that time. The cylinder of the first machine was octagon in shape and used by the Wyoming Valley Knitting Mills, West Pittston, Pa.

The machine is composed of a stationary vat the ends of which are built cylindrically to conform to the diameter of the rotating cylinder which revolves in a vat half submerged in the dye-liquor. The inner surface of the cylinder is perforated. This perforation is made in the solid castings. Across the face of the cylinder are eight cross bars running from head to head. In each of these cross bars are set curved shaped hooks, these hooks pick and open up the stock as the cylinder rotates. The stock is brought from the dye-liquor and when at a proper angle it drops from the hooks back into the liquor again. The action of the hooks handling the stock is similar to the old hand process of "poling stock" as they pick and separate the mass of stock, opening it up and allowing the dye-liquor to thoroughly penetrate it. By thus bringing the stock from the liquor and passing it through the atmosphere, it becomes uniformly oxidized and evenly colored.

The great increase among the mills dyeing raw stock naturally stimulated the dye manufacturer to bring out colors which would be an improvement over those in use and consequently new dye stuffs were gradually evolved, which proved superior to those formerly offered. However, some of these colors, producing very fast and brilliant shades, required certain treatment of the stock not possible with the revolving cylinder type of machine. Early recognizing the importance of producing a machine that would meet requirements fully along this line, the Delahunty Dyeing Machine Co., Pittston, Pa., determined to build a machine that would successfully dye raw stock with cold vat, sulphur, or any other colors; that would also bleach stock equally as well and at the same time still leave this stock in the best possible condition for its future manipulation by the various processes throughout the mill. After the expenditure of much time and labor, what is now commonly designated as the circulating type of machine was adopted. The machine offered, however, while embodying the circulating principle, differs very materially in its application.

The Delahunty circulating dyeing machine, from its first introduction, met with universal approval wherever installed, and solves the problem of successfully dyeing or



bleaching raw stock. The illustration shows the Delahunty No. 5B circulating type, raw stock dyeing and bleaching machine, with the compressor plate raised and rolled back, permitting the unloading and loading of the machine.

The liquor is introduced into the machine by a pipe that leads from the discharge of the circulating pump to the side of the tank, as shown. There is cast on the inside of the tank integral with each side a cast iron pipe which leads around the four sides of tank. This pipe has about 40 openings, which insures an even distribution of the dye or bleach liquor. The perforated bottom plate, which the stock rests upon, sets on this pipe. Near the top of the tank sides there is cast an offset. The machine is loaded with stock above this offset; the top perforated plate is then brought over the tank by means of sprockets and chain, and is screwed down on to this offset by means of a right and left hand screw. The stock that is on the offset makes a joint which prevents any channeling of the dye liquor up the sides of the tank.

This machine has a large overflow or boiling-out box cast on the back tank plate. The dye liquor passing through the stock comes up through the top perforated plate and overflows into this box. There is a steam coil in this box which is used to heat and bring the dye liquor to a boil. Bolted to this boiling-out box is a 4-way valve. This valve is used for admitting fresh water to the machine to wash out the stock after the dyeing operation is finished; also to unload the dye liquor, and when it is in its central position the dye liquor circulates through this valve into the pump; this one valve controlling all these operations, which simplifies the piping system.

Good Weavers Favor
Loom Production
Shambow Shuttles Are Good Weavers.
To Weave Better Cloth and More
of it Per Loom, and at less Cost
for Supplies, get in touch with
Shambow Shuttle Company
Designers of Efficiency Shuttles
Woonsocket R.I.

There is a valve bolted on the side of the boiling box, which is used when the stock is being washed so that the water overflows and is carried off to a drain. All of the piping of this machine is above the floor level, so that there is no foundation work or excavating to be done; the machine can be erected on the dye-house floor, the only foundation necessary is something rigid under the pump and engine.

### An Aid in Examining Export Possibilities.

Persons who expect to travel in South America during the present season will naturally wish to be provided with the most desirable medium through which funds may be made available. This requirement is, perhaps, best met by the Dollar Letter of Credits, issued by The National City Bank of New York, since the wide circulation which it has enjoyed during the past fifteen years renders it a familiar instrument to those to whom it may be presented.

This Letter of Credit is issued in United States Dollars and is accompanied by a List of Correspondents which includes, as paying agents, the representative banks and bankers in the principal cities of Mexico, Central and South America and the West Indies.

A feature which should commend this Letter of Credit to commercial houses having traveling representatives in South America is, that when requested, we will specify the amount which may be paid under it in any one week or month.

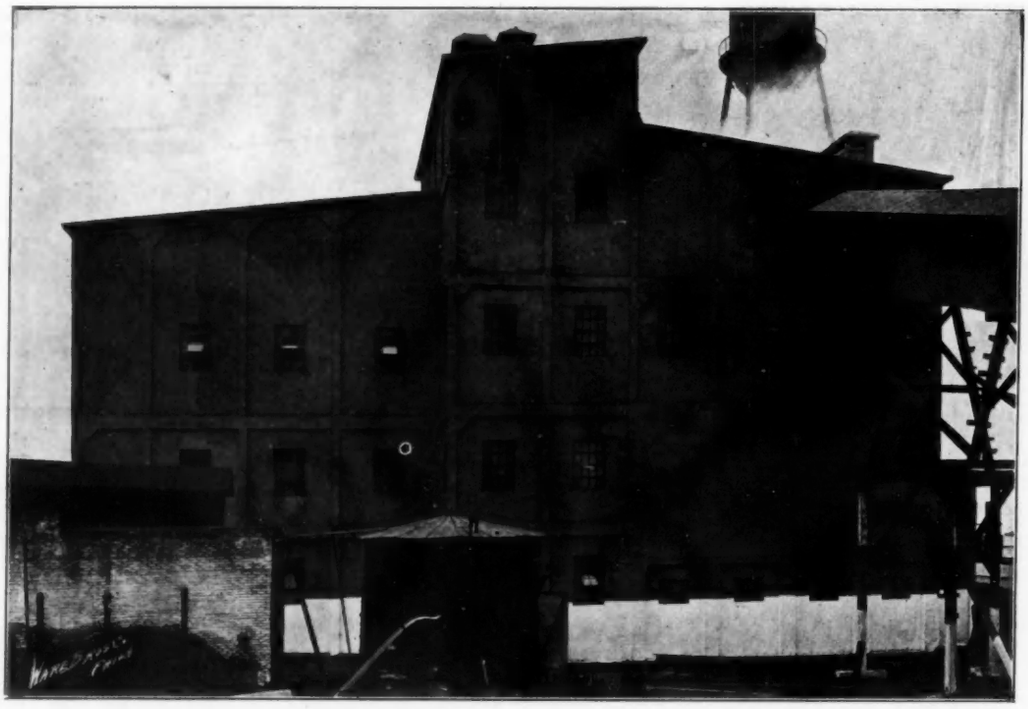
This Dollar Letter of Credit is issued against cash or an approved guarantee. The commission charge in either case is one-half of one per cent.

### The Gate City of the Sunny South.

The establishment of a Southern branch, in Atlanta, to take charge of his steadily increasing business south of Mason and Dixon's line, by Adolph M. Schwarz, the well-known Attorney and Counsellor, who operates a chain of offices and embracing New York City, Chicago, Boston, Detroit and Cleveland, devoted to the handling and collecting of commercial accounts, was made the occasion for Mr. Schwarz to write and publish a most attractive booklet on beautiful and progressive Atlanta.

"The Gate City of the Sunny South," is the title of Mr. Schwarz's first impressions of that enterprising municipality, which is delightfully written, and handsomely printed, and contains within its twenty pages more potent reasons and convincing facts regarding Atlanta, than were ever before compressed within so small a compass. This booklet is already being recognized by the business men of the South, as a power in the advancement of that section of the most favorable character. It is a glowing tribute to "The Gate City of the Sunny South" and is noteworthy because of its excellent descriptive style and immediate grasp of the vital matters that go forward making Atlanta the Great City it is today.

We understand Mr. Schwarz has had 20,000 copies of his booklet printed for free distribution, and he will be glad to mail a copy to any one who may address him, at the Hurt Building, Atlanta, Georgia. As the demand for these "Impressions" is bound to be great and the edition limited, those desiring copies should write for them without delay.



Concrete Fertilizer Plant. Exterior View of a mill building of the permanent and fire-resisting type.

# Concrete Fertilizer Plants

ACCORDING to the "American Fertilizer Hand Book," the value of fertilizers manufactured in the United States annually is something in excess of $175,000,000. The decline in soil fertility is in itself evidence that the output of artificial fertilizers will be largely increased. With the expansion of the business has come the need for better buildings, more elaborate equipment and labor-saving machinery. The most satisfactory and economical material to use in the construction of these plants is concrete. Concrete is especially adapted to factories and mills. It not only represents the maximum of durability, which means decreased maintenance outlay, but is peculiarly suited to the type of rigid construction required where mechanical appliances are in use. For example, this is especially true of foundation work. The monolithic character of concrete makes it superior to either stone or brick for foundation work. A solid, homogeneous mass, it distributes the load equally over the soil on which the foundations are laid. With proper design, and a safe load allowed for the bearing capacity of the soil, there is no danger of settlement. Furthermore, concrete is fire-resisting, an exceedingly important consideration. All of the advantages cited make concrete suitable for fertilizer plants.

Interior view of mill building.

Concrete may be used for foundations, walls, floors, partitions and roofs. The material is impervious and where surfaces are smooth it may be readily cleansed, thus promoting sanitary conditions. It does not decay or rust and means practically the elimination of all bills for repairs in so far as the structure itself is concerned.

Perhaps the fire-resisting properties of concrete is the most important consideration in manufacturing plants of this character. Concrete has been tested in conflagration and in isolated fires and up to date there has been no record of failure under the most severe stress. The most recent notable example of the fireproof qualities of concrete was the survival of the reinforced concrete buildings in the Edison plant at West Orange, N. J. Mr. Edison has stated that of the concrete construction only 12½ per cent. was damaged while 98 per cent. of the machinery contained in these buildings was salvaged, and in some of the structures manufacturing operations soon resumed. The fire-resisting properties of concrete also involve the matter of insurance and rates are very low upon buildings constructed of reinforced concrete throughout. In some cases owners of buildings do not carry insurance on the structures, merely insuring contents. On the subject of insurance the following table is interesting and suggestive:

**CONCRETE BUILDINGS**

Mean security from fire.

Low rates of insurance.

Elimination of maintenance.

Concrete does not decay, rust or burn.

**CONCRETE CONSTRUCTION**

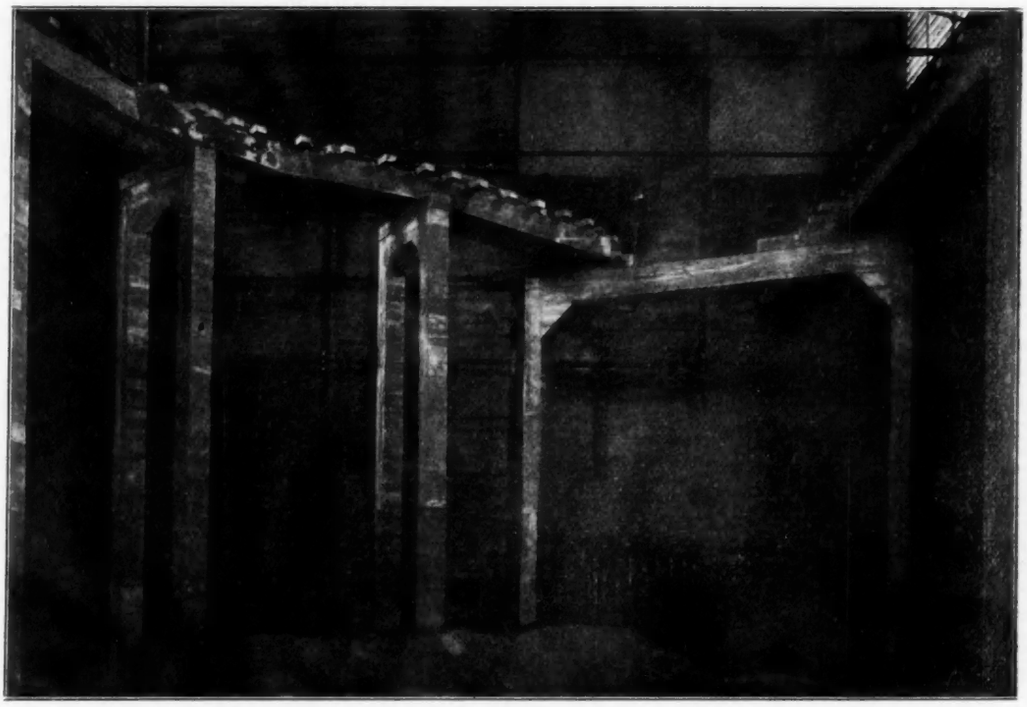
Insures firm foundations.

Rigid, non-vibrating floors.

Improved sanitary conditions.

Depreciation practically negligible.

ADVERTISEMENT



A Concrete Fire Wall. Construction of this type means low rates of insurance. Renewals and repairs are never required.

**COMPARATIVE APPROXIMATE YEARLY COST OF INSURANCE IN CENTS PER $100 OF FACTORY BUILDINGS**
**Exposures none; area not large; good city department; no private fire apparatus except such as pails and standpipes**

| | All concrete | | Brick mill construction or open joists | | Wood mill construction or open joists | | Add for brick or wood buildings in small towns and cities without best of water and fire departments |
|---|---|---|---|---|---|---|---|
| | Building | Contents | Building | Contents | Building | Contents | |
| General storehouse | 20 | 45 | 50 | 100 | 100 | 125 | 25 |
| Wool storehouse | 20 | 35 | 40 | 60 | 75 | 100 | 25 |
| Office building | 15 | 30 | 35 | 50 | 100 | 125 | 25 |
| Cotton factory | 40 | 100 | 100 | 200 | 200 | 300 | 50 |
| Tannery | 20 | 40 | 75 | 100 | 100 | 100 | 25 |
| Shoe factory | 25 | 80 | 75 | 100 | 150 | 200 | 50 |
| Woolen mill | 30 | 80 | 75 | 100 | 150 | 200 | 50 |
| Machine shop | 15 | 25 | 50 | 50 | 100 | 100 | 25 |
| General mercantile | 35 | 75 | 50 | 100 | 100 | 150 | 25 |

Again, where buildings are provided with protected openings and have concrete floors and partitions it is impossible for fire to pass from one department to another. There is no damage from water as it cannot pass through the impervious floors of concrete. Buildings of this type are practically monolithic and such fires as usually occur through carelessness on the part of employees or which may have their origin in waste and debris do not ignite the building, as concrete is unburnable.

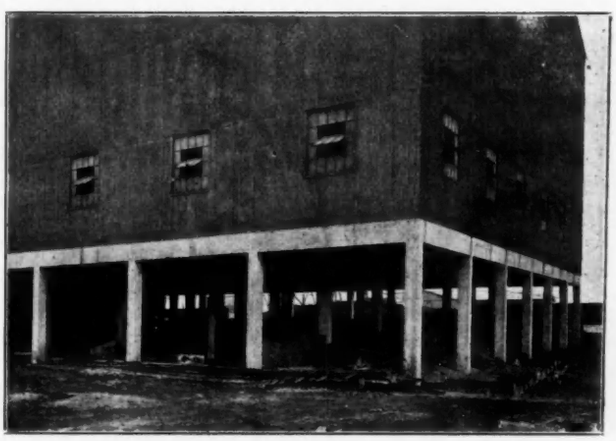
When steel is properly incased in concrete the low heat conductivity of the latter is such that there is no danger of injury to the steel supporting members of the structure. Inferior types of fireproofing, which fall away or readily transmit heat, have been responsible in many conflagrations for the buckling and collapse of the weight-bearing and vital parts of the structure.

The durability and economy of concrete is such that many old plants have been remodeled through the introduction of concrete floors and other architectural features subject to rapid deterioration and decay.

In the matter of cost concrete buildings are from 10 to 20 per cent. cheaper than many other first-class fireproof buildings. Where the parts can be duplicated and the various units used a great number of times the saving is greater. Compared with non-fireproof buildings, concrete will vary from equal cost on large propositions to a cost of 30 per cent. greater on medium sized propositions. The proportionate costs of various types of buildings vary largely with design of the buildings and the local conditions so that no accurate comparison can be made. But taking into consideration the many advantages of concrete buildings, the ultimate cost will be found to be low. In this ultimate cost insurance, depreciation, repairs and up-keep must all be considered.

The ordinary type of non-fireproof construction depreciates at the rate of about 1½ per cent. a year. This is in addition to the necessary painting and repair charges. Careful study of the subject has shown that the value of a building costing $50,000 will, at the end of thirty years be $31,775, showing a depreciation of 36.6 per cent., or 1.2 per cent a year, whereas in the case of the permanent concrete structure, depreciation would be practically negligible.

To achieve the many economies outlined the entire structure should be concrete, which means the power house, mill buildings, acid phosphate dens, dump sheds and sundry types of storage departments or structures.



Concrete Supports for Acid Chamber Building.

ADVERTISEMENT

# VITA BELT OIL

We herein offer an OIL made solely for leather belting, as a lubricant and preservative. It contains sufficient adhesive matter to make the belt pull, however, our aim is especially to add life and durability to the belt: Users of this OIL will find it does not leave the leather hard and brittle after several applications, as does so many materials made for leather dressing. Instead, the belt is thoroughly lubricated and left in a pliable state. If you are having any trouble with your belting write us.

**Arabol Manufacturing Co.**

**100 William Street, NEW YORK CITY**

Southern Sales Agent, Cameron MacRae, Charlotte, N. C.

**PENNSYLVANIA MUSEUM AND SCHOOL OF INDUSTRIAL ART**

**PHILADELPHIA TEXTILE SCHOOL**

International Reputation for Practical Instruction, Adequate Mechanical Equipment, Successful Graduates.

**32nd Session Opens September 20, 1915.**

Courses of Study include all branches of Textile Manufacture.

**COTTON, WOOL, WORSTED, SILK.**

Illustrated Circular and Advice as to suitable courses of study sent on application to

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